M30830T-RPD-E

Emulation Pod for M32C/81, 82, 83 Group MCUs

User's Manual

Rev.1.00
September 1, 2003
REJ10J0260-0100Z

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\SUPPORT\Product-name\SUPPORT.TXT

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Preface

The M30830T-RPD-E is an emulation pod for the M32C/81, 82, 83 Groups of Renesas 16-bit MCUs. It's used with a PC4701 emulator.

This user's manual mainly describes specifications of the M30830T-RPD-E emulation pod and how to setup it. For details on the following products, which are used with M30830T-RPD-E, refer to each product's user's manual.

- Emulator: PC4701 User's Manual
- Emulator debugger: M3T-PD308 User's Manual

All the components of this product are shown in "Table 2.1 Package components" (page 19) of this user's manual. If there is any question or doubt about this product, contact your local distributor.

To use the product properly

Precautions for Safety

- In both this User's Manual and on the product itself, several icons are used to insure proper handling of this product and also to prevent injuries to you or other persons, or damage to your properties.
- The icons' graphic images and meanings are given in "Chapter 1. Precautions for Safety". Be sure to read this chapter before using the product.

When using outside Japan

- When using in Europe, the United States, or Canada, be sure to use both the emulator and the emulation pod which meet local standards. EMI standards are not met when the M30830T-RPD-E is used with the PC4700H or PC4700L emulator.

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MEMO

Chapter 1. Precautions for Safety

This chapter describes precautions for using this product safely and properly. For precautions for the emulator main unit and the emulator debugger, refer to each user's manual included with your product.

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Chapter 1. Precautions for Safety

In both the User's Manual and on the product itself, several icons are used to insure proper handling of this product and also to prevent injuries to you or other persons, or damage to your properties.

This chapter describes the precautions which should be taken in order to use this product safely and properly. Be sure to read this chapter before using this product.

1.1 Safety Symbols and Meanings

⚠ **WARNING**	If the requirements shown in the "WARNING" sentences are ignored, the equipment may cause serious personal injury or death.
⚠ **CAUTION**	If the requirements shown in the "CAUTION" sentences are ignored, the equipment may malfunction.
IMPORTANT	It means important information on using this product.

In addition to the three above, the following are also used as appropriate.

△ means WARNING or CAUTION.

Example: ⚠ **CAUTION AGAINST AN ELECTRIC SHOCK**

⃠ means PROHIBITION.

Example: **DISASSEMBLY PROHIBITED**

● means A FORCIBLE ACTION.

Example: **UNPLUG THE POWER CABLE FROM THE RECEPTACLE.**

The following pages describe the symbols "WARNING", "CAUTION", and "IMPORTANT".

⚠ WARNING

Warning for Installation:

- Do not set this product in water or areas of high humidity. Make sure that the main unit does not get wet. Spilling water or some other liquid into the main unit can cause an unrepairable damage.

Warnings for Use Environment:

- The emulation pod is air-cooled with the ventilation slot. Therefore, do not block the ventilation slot. When heated to high temperatures, the emulation pod may not work properly.
- This equipment is to be used in an environment with a maximum ambient temperature of 35℃. Care should be taken that this temperature is not exceeded.

⚠ CAUTION

Caution to Be Taken for Modifying This Product:

- Do not disassemble or modify this product. Disassembling or modifying this product can cause damage. Disassembling and modifying the product will void your warranty.

Cautions to Be Taken for Handling This Product:

- Use caution when handling the main unit. Be careful not to apply a mechanical shock.
- Do not touch the connector pins of the emulator main unit and the target MCU connector pins. Static electricity may damage the internal circuits.
- Do not pull the emulation pod main unit by the flexible cable (FLX120-RPD) for connecting to the emulator main unit or the flexible cable (FLX160) for connecting the target system. The cable may cause a break.
- Flexible cable (FLX120-RPD) for connecting to the emulator main unit and the flexible cable (FLX160) for connecting the target system are different from earlier models. The slits make them more flexible. However, excessive flexing or force may break conductors.
- Do not use inch-size screws for this equipment. The screws used in this equipment are all ISO (meter-size) type screws. When replacing screws, use same type screws as equipped before.

IMPORTANT

Note on Malfunctions in the PC4701 System:

- If the emulator malfunctions because of interference like external noise, do the following to remedy the trouble.

  (1) Press the RESET button on the emulator front panel.
  (2) If normal operation is not restored after step (1), shut OFF power to the emulator once and then reactivate it.

IMPORTANT

Notes on Downloading Firmware:

- Before using this product for the first time, it is necessary to download the dedicated firmware (control software for the emulation pod built into the PC4701). Please note that, to do this, it is necessary to start up the PC4701 in maintenance mode. For firmware download procedures, see "4.2 Downloading Firmware" (page 48). Once the firmware has been downloaded, the product can be used by simply turning on the power.
- Do not shut off the power while downloading the firmware. If this happens, the product will not start up properly. If power is shut off unexpectedly, redownload the firmware.
- Except when a target status error occurs, if the self-check is not completed successfully, there may be trouble with the product. In such case, contact your sales representative. However, perform the self-check in the below setup.

  (1) Target system: Not connected
  (2) Emulation pod internal switches: At their factory settings

Note on When the Emulator Debugger Ends:

- To restart the emulator debugger after it ends, always shut power to the emulator module off once and then on again.

Note on Final Evaluation:

- Be sure to evaluate your system with an evaluation MCU. Before starting mask production, evaluate your system and make final confirmation with a CS (Commercial Sample) version MCU.

Notes on Target System:

- Pin Vcc of the emulator is connected to the target system to observe the voltage of the target system. Therefore design your system so that the emulator MCU is powered by the target system.
- Keep target system power supply voltage within the MCU's specified range (3.0 to 3.6 V, 4.2 to 5.5 V).
- Do not change the voltage of the target system after turning on the power.
- Before powering on your emulator system, check that the host machine, the emulator main unit, the converter board and target system are all connected correctly. Next, turn on the power to each equipment following the procedure below.

  (1) Turn ON/OFF the target system and the PC4701 emulator as simultaneously as possible.

  (2) When the PC4701 and emulator debugger start up, check the target status LEDs on the emulator main unit's front panel to see if this product is ready to operate.

  - Is the power supplied? Check that target status LED (POWER) is ON.
  - Is the reset released? Check that target status LED (RESET) is OFF.

  For details, see "Chapter 4. Usage" (page 45).

Note on RESET* Input:

- The reset input from the target system is accepted only while a user program is being executed (only while the RUN status LED on the PC4701's front panel is lit).

IMPORTANT

Note on RDY* Input:

- Be sure to input "L" to pin RDY* of the target system during the user program executing (only while the RUN status LED on the PC4701's front panel is lit). Inputting "L" to pin RDY* during the user program stopping may cause a malfunction of the emulator.

Note on HOLD* Input:

- Be sure to input "L" to pin HOLD* of the target system during the user program executing (only while the RUN status LED on the PC4701's front panel is lit). Inputting "L" to pin HOLD* during the user program stopping may cause a malfunction of the emulator.

Note on NMI* Input:

- NMI* input from the target system is accepted only while a user program is being executed (only while the RUN status LED on the PC4701's front panel is lit).

Notes on Interruption:

- Even while the user program is not being executed (when the user program is paused or while debug programs are running), the evaluation MCU is operating for controlling debug programs. Therefore, take note that timers and other functions are not stopped while the user program is not being executed.
- When a maskable interrupt is generated in user program execution (when the user program is paused or while debug programs are running), the interrupt cannot be accepted, because the emulator disables interrupts. If an interrupt is requested while a user program is not being executed and the user program allow the interrupt, the interrupt is accepted immediately after the user program execution is started.
- When the user program is not being executed (when the user program is paused or when run-time debugging is being performed), a peripheral I/O interruption is not accepted. Take note that when the user program is not being executed, a request a peripheral I/O interruption can be cleared.

Note on Clock Supply to the MCU:

- Clock can be supplied to the evaluation MCU in one of the following two ways. This is determined by emulator debugger clock selection.

  (1) When Internal is selected:

  The clock generated by the oscillation circuit in the emulation pod is supplied to the evaluation MCU. The clock is continually supplied to the evaluation MCU regardless of "target system clock status" and "user program execution status".

  (2) When External is selected:

  Clock supply to the evaluation MCU depends on oscillation status (oscillate/off) of the target system.

IMPORTANT

Notes on Access Prohibited Area:

- The emulator control register (000020h - 00003Fh) in the SFR is read and write-protected. When this register is accessed, emulator control cannot be utilized.
- With this product, address FFFFFFh cannot be read or written in correctly.

Notes on Stack Area:

- With this product, a maximum 20 bytes of the user stack is consumed as work area.
- If the user stack does not have enough area, do not use areas which cannot be used as stack (SFR area, RAM area which stores data, or ROM area) as work area. Using areas like this is a cause of user program crashes and destabilized emulator control. Therefore, ensure the +20 byte maximum capacity used by the user program as the user stack area.
- With this product, the interrupt stack pointer (ISP) is set to 0500h and used as stack area after the reset is released.

Notes on Reset Vector Area:

- For a reset vector area, memory of the emulation pod is always selected regardless of the setting of EMEM dialog box. Therefore when setting microprocessor mode, to use a ROM of the target system etc. as an area including a reset vector area, set a reset vector using a dump window etc.
- The reset vector area can be changed only when a program is stopped. When a program is executed, the area can not be changed.

IMPORTANT

Notes on EMEM Dialog Box:

Observe the following when setting up EMEM dialog box of the emulator debugger.

(1) Debug Monitor Bank Address

- When "F0" is specified, 64 KB of area starting from F00000h are allocated for use by the debug monitor.
- The 64 KB allocated to the debug monitor cannot be used.
- The below areas cannot be set for the debug monitor.

  (1) MCU internal resources (RAM/SFR area)
  (2) DRAM area or multiplex area
  (3) Interrupt vector area

- It is not possible to view or set the content of the specified area. Even on the dump window or in the reverse assemble area of the program/source windows, the content of this area is not displayed correctly though it can be displayed.

(2) Processor Mode

- Set the target MCU to processor mode.
- To set the single-chip mode and memory expansion mode, pin CNVSS used with MCU status must be low. MCU status indicates pin level of the target system.
- To set microprocessor mode, pin CNVSS used with MCU status must be high.
- To set the memory expansion mode and microprocessor mode, pins RDY* and HOLD* used with MCU status must be high.

(3) Emulation Memory Allocation

- The 1.5MB memory mounted in the product can be allocated out.
- When the single chip mode or memory expansion mode is set by specifying processor mode, emulation memory is automatically allocated to the ROM area. Therefore, it is not necessary to deliberately specify emulation memory as expansion area in order to allocate the ROM area.
- Except for the SFR, RAM, ROM and internally reserved areas, all areas other than the internal reserved area are externally accessible.
- MCU internal resources are automatically selected as SFR and RAM areas regardless of settings.
- Be careful that the specified areas do not overlap one another.
- Set memory allocation so that the total of the 4 length values does not exceed the emulation memory size (1.5 MB).
- Do not set unusable areas for memory allocation.
- Emulation pod memory is automatically selected as reset vector area regardless of settings.

Note on Software Break:

- Software breaks generate break interruptions by forcibly inserting a BRK instruction "08h" instead of a instruction code. Therefore, when referencing the result of a trace in bus mode, "08h" is displayed for the instruction fetch address where a software break is set.

IMPORTANT

Note on Differences between Actual MCU and Emulator:

- Operations of the emulator differs from those of mask MCUs as listed below.

  (1) Reset condition

  (2) Initial values of internal resource data at power-on

  (3) Interrupt stack pointer (ISP) after releasing reset

  (4) Internal memories (ROM and RAM) capacities, etc.

  This emulator system has an MCU with 31KB RAM (0400h - 7FFFh). In single-chip mode or memory expansion mode, emulation memory for internal ROM is automatically allocated in the area between F80000h through FFFFFFh*[1], and it can be read and written into.

  *1: When the MCU file "M30835.MCU" is selected:
  This area depends on the ROM area specified in the MCU file of the emulator debugger. With this product, this area can be expanded up to 1 MB (F00000h - FFFFFFh).

  (5) Oscillator circuit

  - Make note of the fact that in the oscillator circuit where a resonator is connected between pins X_{IN} and X_{OUT}, oscillation does not occur because a flexible cable, buffer IC and other devices are used between the evaluation MCU and the target system. It is same for sub-clock oscillators (X_{CIN} and X_{COUT}).
  - For notes on when using the oscillator circuit on the target system, refer to "3.3 (1) Using the Oscillator Circuit on the Target System" (page 30).

  (6) A-D conversion

  As a flexible cable, a pitch converter board and other devices are used between the evaluation MCU and the target system, some characteristics are slightly different from those of the actual MCU. Perform final evaluations of the A-D converter with the actual MCU.

  (7) Port P15

  As a part of I/O port (P15) is connected to the target system through the analog switch circuit, electric characteristics slightly differ from those of the actual MCU.

Notes on Watchdog Function:

- The MCU's watchdog timer can be used only while programs are being executed. To use it otherwise, disable the watchdog timer. And take note that when the following two conditions are satisfied, programs can not be executed.

  (1) The watchdog timer function selection bit (CM06) of the system clock control register 0 is set to "1".

  (2) The HOLD function is used while the watchdog timer is operating.

- If the reset circuit of the target system has a watchdog timer, disable it when using the emulator.

IMPORTANT

Notes on A-D Input Selection Function:

- To use A-D input group selection, it is necessary to set the direction register of port P15 to input. Port P15 corresponds to the pin that performs A-D conversion.

  Example: To select A-D input for P00-P07, set the direction register of P150-P157 and P00-P07 to input.

  Also, when the port P0 group and port P2 group are selected for A-D input, port P15 cannot be used as an I/O port.

- Because a flexible board and other elements exist between the evaluation MCU and target system, the A-D converter operates differently than the actual MCU. Perform final evaluations of the A-D converter with the actual MCU.

Note on DMA Transfer:

- With this product, the program is stopped with a loop program to a specific address. Therefore, if a DMA request is generated by a timer or other source while the program is stopped, DMA transfer is executed. However, make note of the fact that DMA transfer while the program is stopped may not be performed correctly. Also note that the below registers have been changed to generate DMA transfer as explained here even when the program is stopped.

  DMA0 transfer counter register DCT0
  DMA1 transfer counter register DCT1
  DMA0 memory address register DMA0
  DMA1 memory address register DMA1
  DMA2 transfer counter register DCT2 (R0)
  DMA3 transfer counter register DCT3 (R1)
  DMA2 memory address register DMA2 (A0)
  DMA3 memory address register DMA3 (A1)

Note on DMAC II Transfer Completion Interrupts:

- You can use DMAC II transfer completion interrupts during program execution only. Do not generate DMAC II transfer completion interrupts when you use any function but program execution.

Note on Address Match Interrupt:

- To debug with the address match interrupt, set the software and hardware breaks in the top address used in address match interrupt processing.
- Do not single-step an address where an address-match interrupt occurs.

Note on Protect Register:

- Make note of the fact that the protect is not canceled when protect register 3 (PRC2), which enables writing in the port P9 direction register and the pin output function select register, is changed with the below procedure.

  (1) Step execution of the "instruction for setting ("1") PRC2"

  (2) Setting the break point from the "instruction for setting ("1") PRC2" to when the "port P9 direction register or pin output function select register 3 is set"

  (3) Setting "("1") PRC2" from the dump window or script window during user program execution

IMPORTANT

Note on Ring Oscillator:

- Take note that you can not debug a program using the oscillation stop detection function (ring oscillator). To use this function, be sure to evaluate a system with the actual MCU.

Note on PLL Clock:

- The PLL clock can be used as a clock for peripheral functions only. You can not debug your program using it as a CPU clock. To use the PLL clock as a CPU clock, be sure to evaluate your system with an actual MCU.

Note on Support for M32C/81 and 82 Groups:

- The M30830T-EPB has the M30835FJGP of M32C/83 Group as an evaluation MCU. Because of the differences of ROM and RAM sizes and peripheral functions, to develop a program for an M32C/81 or 82 Group MCU, refer to the User's Manual of M32C/81, 82 Group MCUs.

Chapter 2. Preparation

This chapter describes the package components, the system configuration and the preparation for using this product for the first time.

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Chapter 2. Preparation

2.1 Terminology

Some specific words used in this user's manual are defined as follows:

Emulator system

This means an emulator system built around the PC4701 emulator. The PC4701 emulator system is configured with an emulator main unit, emulation pod, host machine and emulator debugger.

Emulator main unit (Hereafter PC4701)

This means a generic name for emulators for 8 and 16-bit MCUs. For details on specific models of PC4701, visit the Renesas Tools Homepage at the following URL. The PC4700L and PC4701L are not eligible for technical support.

http://www.renesas.com/en/tools

Emulation pod

This means the M30830T-RPD-E (this product). This emulation pod is for M32C/81, 82, 83 Group MCUs.

Host machine

This means a personal computer used to control the emulator and emulation pod.

Emulator debugger

This means a software tool M3T-PD308 to control the emulator from the host machine through an interface.

Firmware

Program that analyzes contents of communication with the emulator debugger and controls the emulator hardware. This program is installed in the EEPROM. This program is downloadable from the emulator debugger to upgrade the firmware or to support other MCUs.

Software break

A software break is a function to break the program before the system executes an instruction at the specified address. The instruction at the preset address will not be executed.

Hardware break

A hardware break is a function to break the program when the system detects a write/read of data to/from memory or a rise/fall edge of the signal entered from the external trace cable. The former break function is called data break; and the latter break function is called trigger break. While the instruction at the address where the software break is set is not executed, a hardware break is performed after the specified instruction is executed.

Evaluation MCU

This means the microcomputer mounted on the emulation pod which is operated in the specific mode for tools.

Target MCU

This means the microcomputer you are going to debug.

Target system

This means a user's application system using the microcomputer to be debugged.

*****

In this user's manual, this symbol is used to show active Low. (e.g. RESET*: Reset signal)

2.2 Package Components

The M30830T-RPD-E package consists of the following items. When unpacking, check to see if your M30830T-RPD-E contains all of these items.

Table 2.1 Package components

Item	Quantity
M30830T-RPD-E emulation pod main unit	1
FLX120-RPD flexible cable for connecting emulator main unit	1
FLX160-PRB converter board for connecting FLX160 to M30800T-PTC (mounted on FLX160)	1
M30800T-PTC converter board for 100-pin LCC package	1
OSC-2 oscillator circuit board (bare-board)	1
IC61-1004-051 100-pin LCC socket	1
Hardware tool user registration FAX sheet (English)	1
Hardware tool user registration FAX sheet (Japanese)	1
M30830T-RPD-E user's manual (this manual)	1
M30830T-RPD-E user's manual (Japanese)	1

* Please keep the M30830T-RPD-E's packing box and cushion material in your place for reuse at a later time when sending your product for repair or other purposes. Always use these packing box and cushion material when transporting the M30830T-RPD-E.
* If any of these items are missing or found faulty, please contact your local distributor.
* If there is any question or doubt about the packaged product, contact your local distributor.
* For purchasing the IC61-1004-51 or for technical information, contact Yamaichi Electronics Co., Ltd. (http://www.yamaichi.co.jp/e/index.shtml)

2.3 Other Tool Products Required for Development

To bring forward programs development on the M32C/81, 82, 83 Group MCUs, the products listed below are necessary in addition to those contained package above. Get them separately.

Table 2.2 Other tool products

Product		Product name	Notes
Emulator main unit		PC4701	Required
Emulator debugger		M3T-PD308 (V.3.00 or later)	Required
Converter boards	144-pin 0.5-mm-pitch LQFP (144P6Q-A)	M3T-FLX-144NSD	Required according to the foot pattern of the target system (see 3.6 "Connecting the Target System" on page 36)
	100-pin 0.5-mm-pitch LQFP (100P6Q-A)	M3T-100LCC-QSD	
		M3T-100LCC-DMS + M3T-FLX-100NSD	
		M3T-F160-100NSD	
	100-pin 0.65-mm-pitch QFP (100P6S-A)	M3T-100LCC-DMS + M3T-DUMMY100S	
		M3T-100LCC-DMS + M3T-DIRECT100S	
		M3T-100LCC-DMS + M3T-FLX-100NRB	

* To purchase these products, contact your nearest distributer.

2.4 Name of Each Part

(1) System Configuration

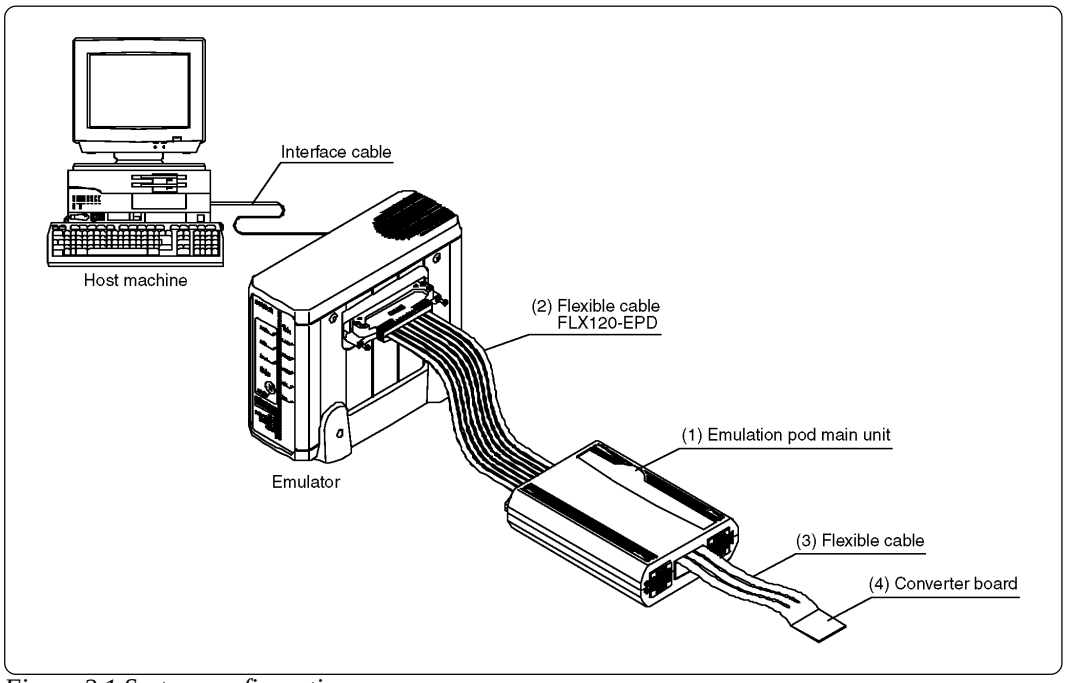

Figure 2.1 System configuration

(1) to (4) in Figure 2.1 are included in this product package.

(1) Emulation pod (M30830T-RPD-E)

This emulation pod contains an evaluation MCU, emulation memory and circuit to feature the debugging functions.

(2) Flexible cable (FLX120-RPD)

This 120-pin flexible cable connects the PC4701 emulator and the emulation pod.

(3) Flexible cable (FLX160)

This 160-pin flexible cable connects the emulation pod and the target system.

(4) Converter board

This is a converter board for connecting to the target system.
For details, refer to "3.6 Connecting the Target System" (page 36).

(2) Inside of the Emulation Pod

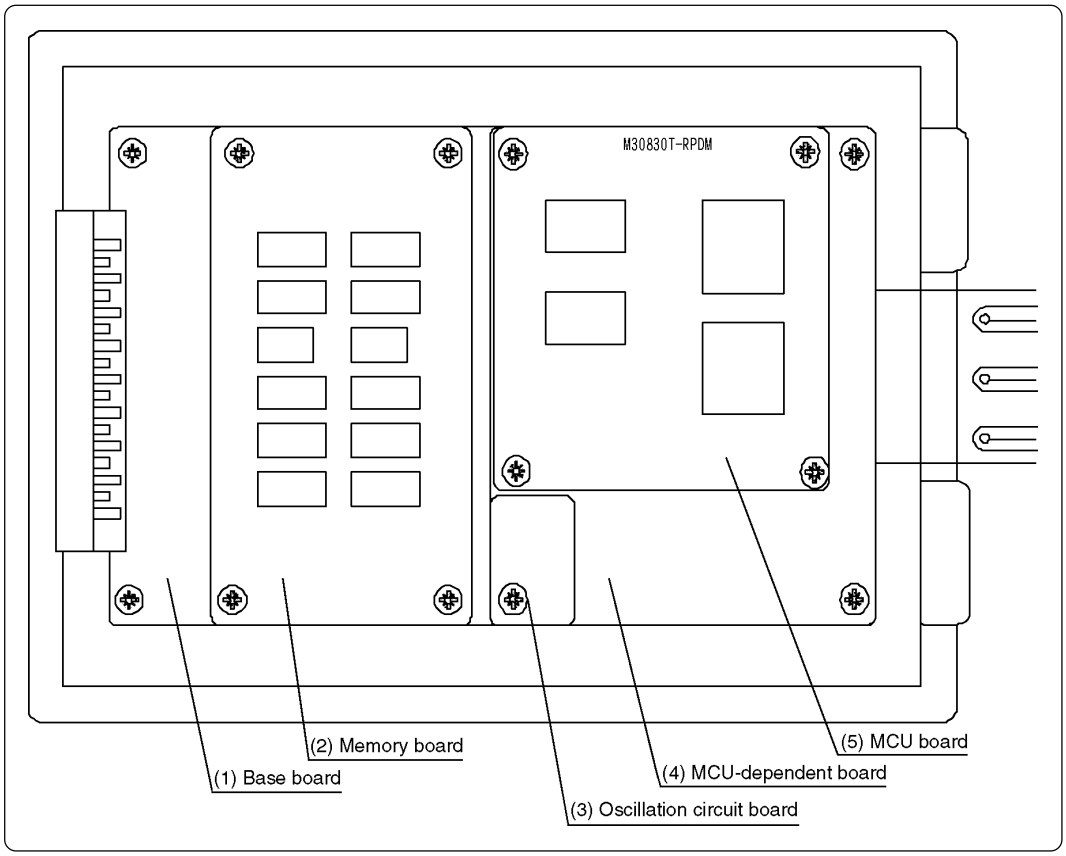

Figure 2.2 Internal view of the emulation pod

(1) Base board

Base board for the M32C/80 Series MCUs which controls the interface with the PC4701 and the evaluation MCU.

(2) Memory board

Board on which the 1.5MB emulation memory is mounted.

(3) Oscillation circuit board

Board on which the internal oscillation circuit of the emulation pod is mounted. Operating frequency can be changed by replacing this board with other available oscillation circuit boards.

(4) MCU-dependent board

Board grouping parts (number of pins or added functions) which vary according to MCU model.

(5) MCU board

Board on which the MCU and the emulation memory for the MCU's internal ROM are mounted.

It is planned to enable customers to use future M32C/81, 82, 83 Group MCU models (Max. 20 MHz applicable frequency) by changing the MCU-dependent board and MCU board.

2.5 When Using the Emulator for the First Time

If you have purchased this emulation pod newly, it is necessary to download the firmware. The download procedure is given in Figure 2.3.

Before attempting to download the firmware, check the emulator debugger is installed and the emulator is connected to the host machine. For more information, see each user's manual of the emulator debugger and the PC4701.

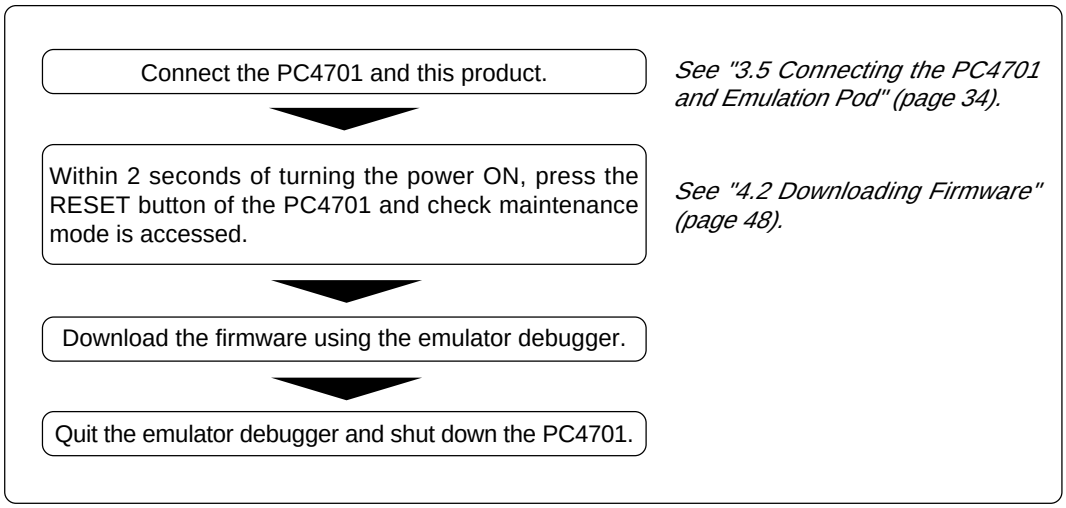
Connect the PC4701 and this product.
See "3.5 Connecting the PC4701 and Emulation Pod" (page 34).
Within 2 seconds of turning the power ON, press the RESET button of the PC4701 and check maintenance mode is accessed.
See "4.2 Downloading Firmware" (page 48).
Download the firmware using the emulator debugger.
Quit the emulator debugger and shut down the PC4701.

Figure 2.3 Firmware download procedure when the emulator is used for the first time

To make sure the emulation pod works properly, run the self-check. For self-check procedures, see "4.4 Self-check" (page 53).

Chapter 3. Setting Up

This chapter describes switch settings required for using this product and how to connect this product to the PC4701 and the target system.

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(7) Connecting 100-pin 0.5-mm-pitch Foot Pattern (Part 3) 43
(8) Connecting 144-pin 0.5-mm-pitch Foot Pattern 44

Chapter 3. Setting Up

To use this emulation pod with your application system, it is necessary to make settings as follows. Set the following after removing the upper cover.

- Change the oscillation frequency.
- Set pins X_{CIN} and X_{COUT} for the target system.
- Set the signals such as HOLD/RDY to control the external device.
- Install the A-D conversion bypass capacitor.

3.1 Removing the Upper Cover

The procedure of removing the upper cover is shown below.

(1) Remove the four screws of both sides of this product and lift off the upper cover (see Figure 3.1).
(2) Set the jumper switches.
(3) Replace the upper cover and secure the four screws.

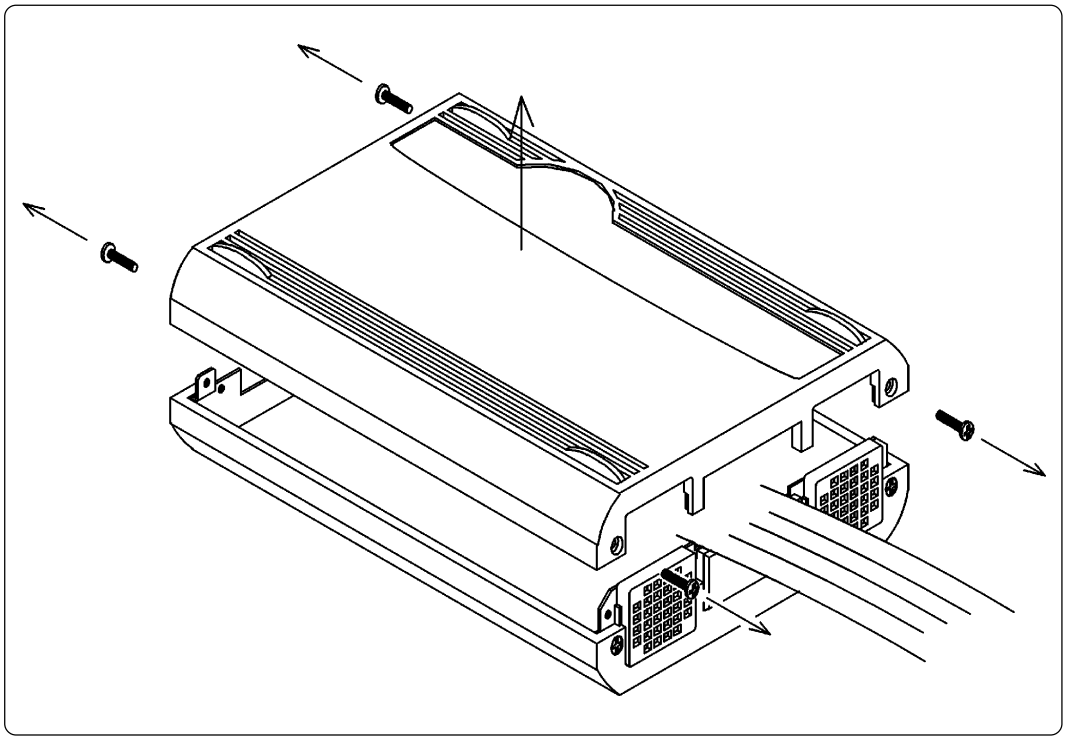


Figure 3.1 Removing the upper cover

⚠ CAUTION

When Removing the Upper Cover:

- Always shut OFF power when removing the upper cover or setting the switches.
- Do not touch the connector pins of the emulator main unit and the target MCU connector pins. Static electricity may damage the internal circuits.

3.2 Switch Settings

Figure 3.2 shows the positions of the switches and Tables 3.1, 3.2 and 3.3 show each switch setting.

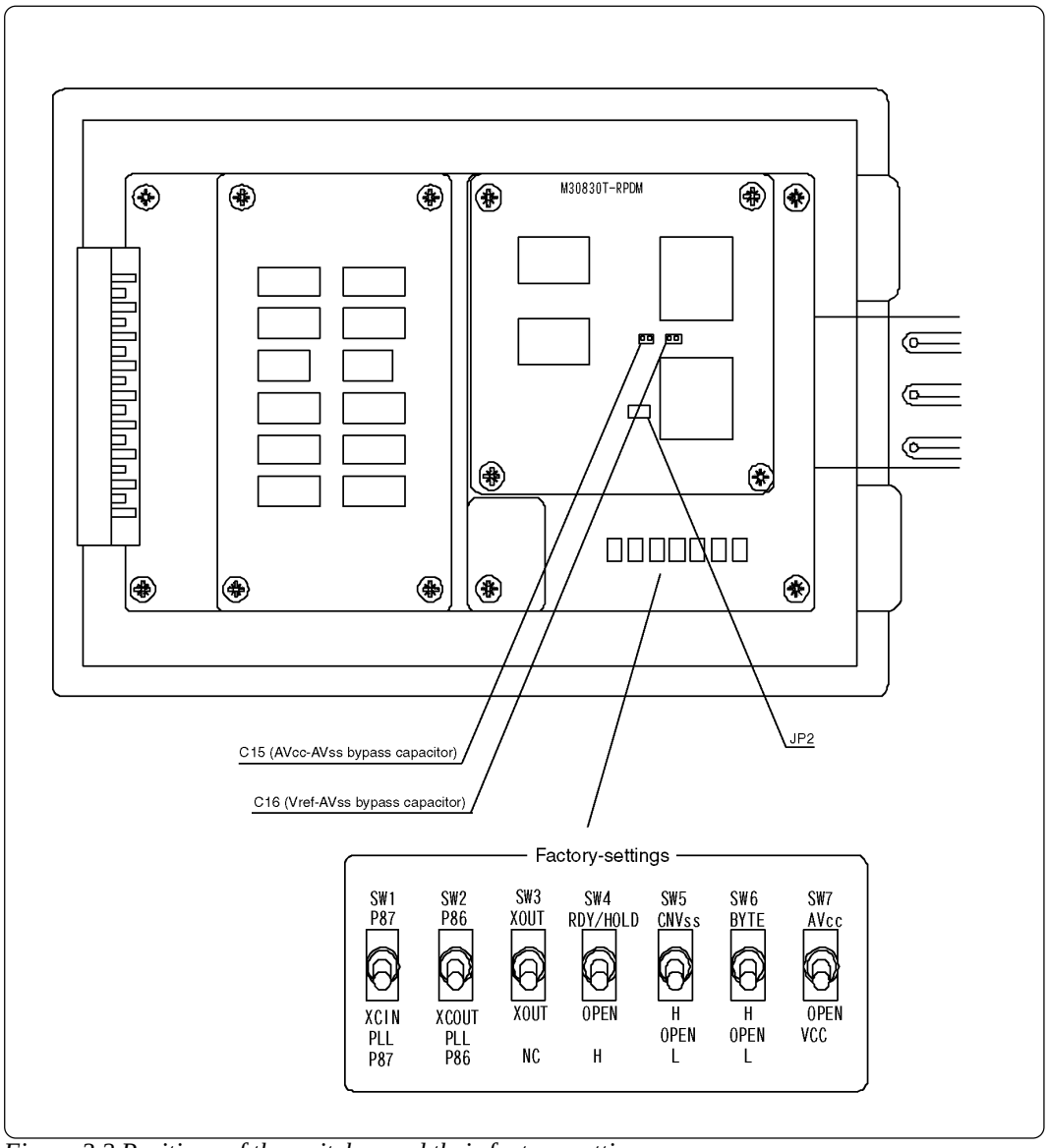


Figure 3.2 Positions of the switches and their factory-settings

Table 3.1 Switch settings of the M30830T-RPD-E (1/4)

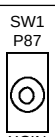
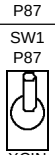
Signal	Switch	Setting	Description
P87/X_{CIN} P86/X_{COUT}	SW1	Factory-setting	Connects pin P87/X_{CIN} of the MCU to the target system (uses pin P87/X_{CIN} as port P87).
			Connects the LPF circuit on the emulation pod when using the PLL function. In this setting, it is necessary to set the JP2 on the M30830T-RPDM board.
			Connects pin P87/X_{CIN} of the MCU to the sub-clock oscillator (32.768 kHz) on the emulation pod.
	SW2	Factory-setting	Connects pin P86/X_{COUT} of the MCU to the target system (uses pin P86/X_{COUT} as port P86). Set to this position when using the PLL function too.
			Connects pin P86/X_{COUT} of the MCU to the target system (uses pin P86/X_{COUT} as X_{COUT}).
X_{OUT}	SW3	Factory-setting	Pin X_{OUT} of the MCU is unconnected.
			Connects pin X_{OUT} of the MCU to the target system.

Table 3.2 Switch settings of the M30830T-RPD-E (2/4)

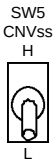
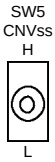
Signal	Switch	Setting	Description
RDY*/ HOLD*	SW4	Factory-setting	Pulls up pins RDY* and HOLD* of the MCU with a resistance of 33 kΩ. Be sure to set this when using the emulation pod without the target system.
			Connects pins RDY* and HOLD* of the MCU to the target system.
CNV_{SS}	SW5	Factory-setting 	Pulls down pin CNV_{SS} with a resistance of 33 kΩ (when the target system is unconnected in single-chip mode or memory expansion mode). Be sure to set this when using the emulation pod without the target system.
			Connects pin CNV_{SS} to the target system.
			Pulls up pin CNV_{SS} with a resistance of 33 kΩ (when the target system is unconnected in microprocessor mode). Be sure to set this when using the emulation pod without the target system.
BYTE	SW6	Factory-setting	Pulls down pin BYTE with a resistance of 33 kΩ (when the target system is unconnected in 16-bit bus mode). Be sure to set this when using the emulation pod without the target system.
			Connects pin BYTE to the target system.
			Pulls up pin BYTE with a resistance of 33 kΩ (when the target system is unconnected in 8-bit bus mode). Be sure to set this when using the emulation pod without the target system.

Table 3.3 Switch settings of the M30830T-RPD-E (3/4)

Signal	Switch	Setting	Description
AV_{CC}/AV_{SS}	SW7	Factory-setting	Connects the V_{CC} and V_{SS} to pins AV_{CC} and AV_{SS} of the MCU, respectively. Be sure to set this when using the emulation board without the target system.
			Connects pin AV_{CC}/AV_{SS} of the MCU to the target system.

IMPORTANT

Note on Switch Setting:

- Switch settings of RDY*/HOLD*, CNVss, BYTE and AV_{CC}/AV_{SS} are provided to enable debugging without connecting to the target system. When using the emulator debugger in connection with the target system, set SW4 and SW7 to the OPEN positions and SW5 and SW6 to the center positions.

Table 3.4 Switch settings of the M30830T-RPD-E (4/4)

Signal	Switch	Setting	Description
PLL	JP2 M30830T-RPDM Board	JP2 PLL ON OFF (Factory-setting)	Use this setting normally.
		JP2 PLL ON OFF	Set this when using the PLL function.

IMPORTANT

Note on PLL Function:

- To use the PLL function, the following settings are necessary.

  (1) Set SW1 to PLL.
  (2) Set SW2 to P86.
  (3) Set JP2 of MCU board M30830T-RPDM to ON.
  (4) Set port P87 direction register (bit 7 of 03C6h) to input.
  (5) Set port XC switch bit (bit 4 of 0006h) to I/O function.
  (6) Set port P86 direction register (bit 6 of 03C6h) to input.
  (7) Connect the VSS to port P86.

3.3 Selecting Clock Supply

There are two ways to supply a clock to the MCU, using the oscillator circuit of the emulation pod or using the oscillator circuit on the target system. Table 3.4 shows the factory-settings of each clock supply.

Table 3.4 Clock supply to the MCU

Clock	Description	Display of emulator debugger	Factory-setting
X_{IN}-X_{OUT}	Internal oscillator circuit of emulation pod (OSC-3: 20 MHz)	Internal	Yes
	Target system	External	-
X_{CIN}-X_{COUT}	Internal oscillator circuit of emulation pod (32.768 KHz)	Internal	Yes
	Target system	External	-

IMPORTANT

Notes on Changing Clock Supply:

- Clock supply can be set by the Init dialog box when starting up the emulator debugger or inputting CLK command on the script window.
- For pins X_{CIN} and X_{COUT}, it is necessary to set the switches in the emulation pod when using the clock on the target system. For details, refer to "3.2 Switch Settings" (page 25).

(1) Using the Oscillator Circuit on the Target System

When turning on the power supply, the internal clock of the emulation pod is selected to supply the clock to the MCU. To use the external clock on the target system, change the clock by the CLK command or the Init dialog on the emulator debugger. (For details, refer to the user's manual of the emulator debugger.)

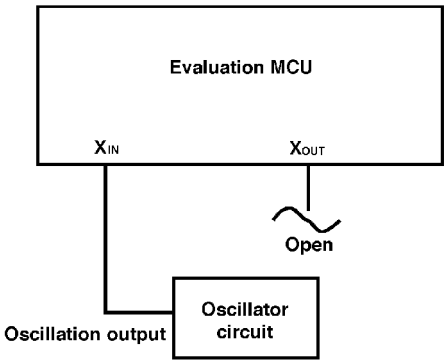


Figure 3.3 External oscillator circuit

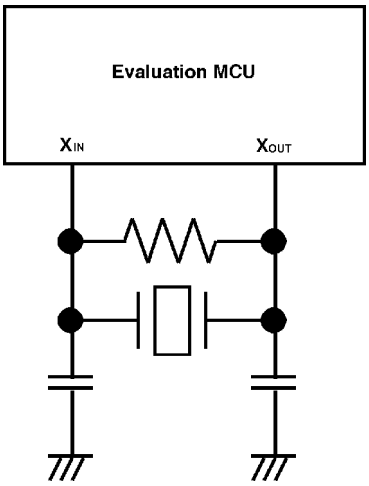


Figure 3.4 Circuit in which oscillation does not occur (same for XCIN-XCOUT)

IMPORTANT

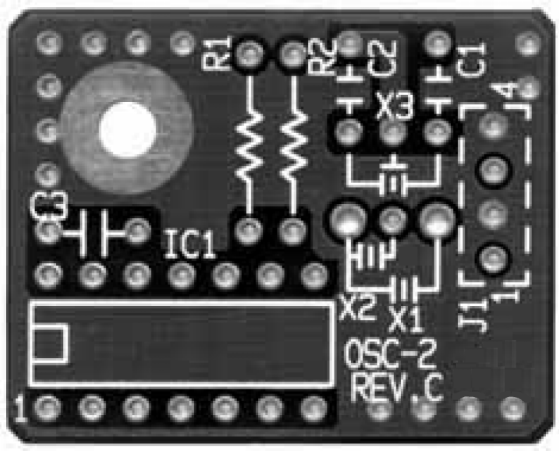
Notes on External Clock:

- To operate the emulation pod with an external clock, construct the oscillator circuit as shown in Figure 3.3 in the target system and input the oscillator output at 50% duty (within the operating range of the evaluation MCU) into pin XIN. And pin XOUT should be open.
- Make note of the fact that in the oscillator circuit shown in Figure 3.4 where a resonator is connected between pins XIN and XOUT, oscillation does not occur because a flexible cable, buffer IC and other devices are used between the evaluation MCU and the target system. It is same for sub-clock oscillator circuits (XCIN and XCOUT).

(2) Changing the Internal Oscillator Circuit of the Emulation Pod

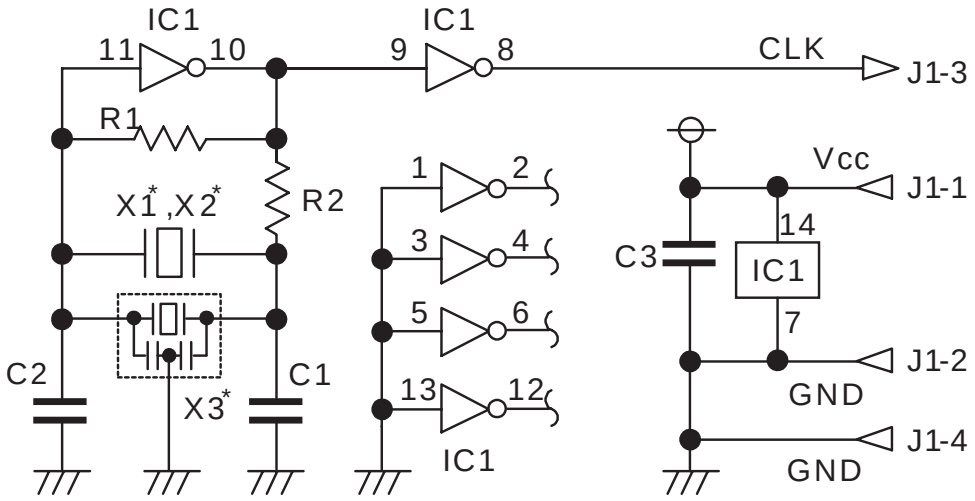
An oscillator circuit board (OSC-3) for 20 MHz is mounted on this product. To use the emulation pod at a frequency other than 20 MHz, build the desired oscillator circuit on the included OSC-2 oscillator circuit board (bare board) and replace the board installed in the emulation pod when shipped from the factory.

Figure 3.5 shows a view of the OSC-2 oscillator circuit board (bare board) and where connector pins are located. Figure 3.6 shows the circuitry of the OSC-2 oscillator circuit board (bare board). Use the number of oscillator circuits recommended by the oscillator manufacturer.



J1-4: GND
J1-3: Oscillator output
J1-2: GND
J1-1: Vcc

Figure 3.5 External view of the oscillator board (OSC-2) and connector pin assignments



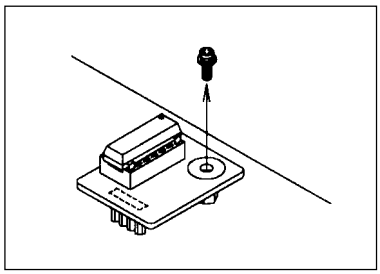
*** X1: 5.08-mm-pitch 2-pin oscillator**
X2: 2.54-mm-pitch 2-pin oscillator
X3: 2.54-mm-pitch 3-pin oscillator

IC1: Inverter (Unbuffer)

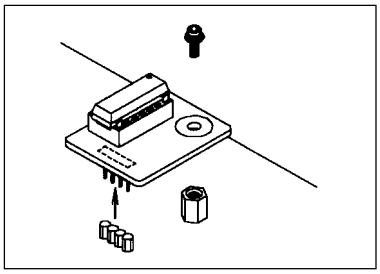
Figure 3.6 Circuit of the oscillator board (OSC-2)

(3) Replacing the Oscillator Circuit Boards

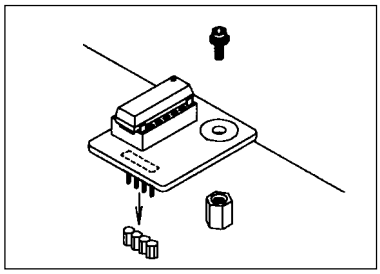
Figure 3.7 shows how to replace the oscillator circuit boards. For the position of the oscillator circuit board, see Figure 2.2.



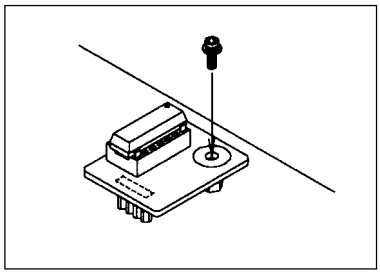
(1) Unscrew the screw connecting the oscillator circuit board.



(2) Lift off the oscillator circuit board.



(3) Attach the J1 connector of another oscillator circuit board for replacement to the connector of the MCU-dependent board.



(4) Secure the oscillator circuit board with the screw.

Figure 3.7 Replacing the oscillator circuit boards

3.4 A-D Conversion Bypass Capacitor

The emulation pod has foot patterns on the board for mounting a bypass capacitor. Mount a suitable bypass capacitor as occasion demands.

Figure 3.2 shows where the bypass capacitors are mounted, whereas Figure 3.8 shows an enlargement of the foot patterns.

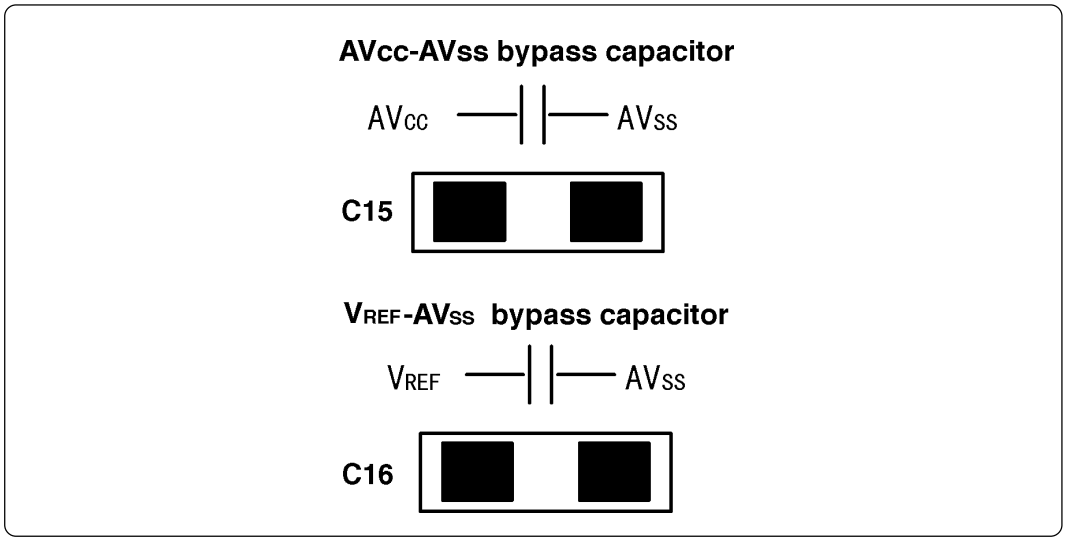


Figure 3.8 Foot patterns of A-D conversion bypass capacitor

IMPORTANT

Note on the A-D Converter:

- Because a flexible board and other devices are used between the evaluation MCU and the target system, the A-D converter operates differently from the actual MCU. Make the final evaluation of the A-D converter from the actual MCU.

3.5 Connecting the PC4701 and Emulation Pod

To connect the emulation pod to the PC4701, use the FLX120-RPD 120-pin flexible cable included in this product package. Connect the PC4701 side connector of the FLX120-RPD to the cable connector of the PC4701, then secure with screws.

(1) Connecting the Cable to the PC4701

Figure 3.9 shows how to connect the PC4701 and FLX120-RPD.

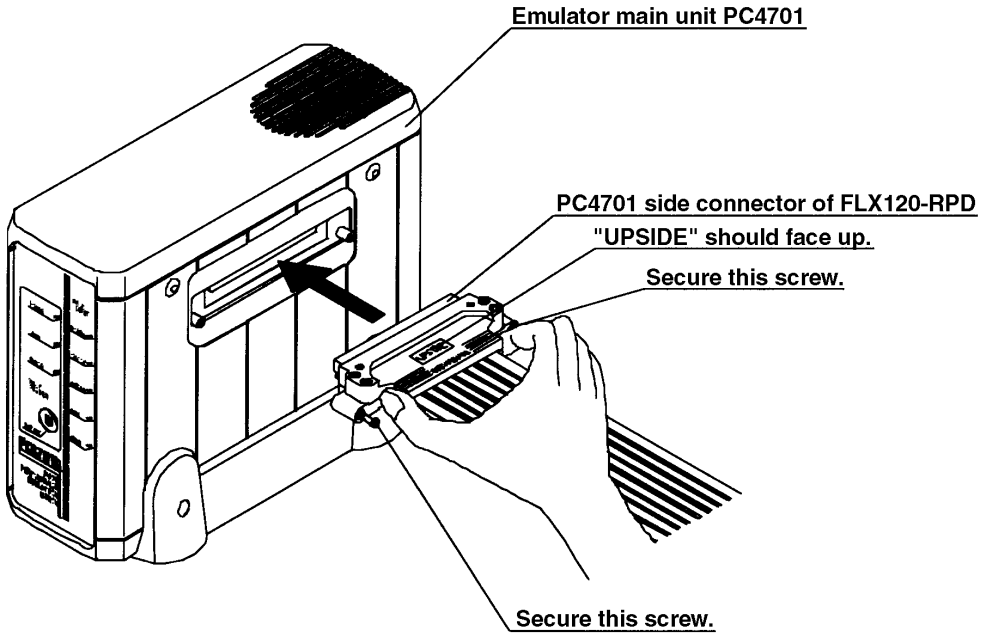


Figure 3.9 Connecting the PC4701 and FLX120-RPD

⚠ CAUTION

Notes on Connecting the Cable:

- To connect the FLX120-RPD, be sure to hold the both sides of the PC4701 side connector horizontally with the "UPSIDE" facing up.
- Always shut OFF power before connecting the cable. The power ON state could destroy internal circuits.

Note on Securing the Screws:

- After connecting the emulator main unit to the cable, be sure to secure the screws.

(2) Connecting the Cable to the Emulation Pod

Figure 3.10 shows how to connect the FLX120-RPD and the emulation pod.

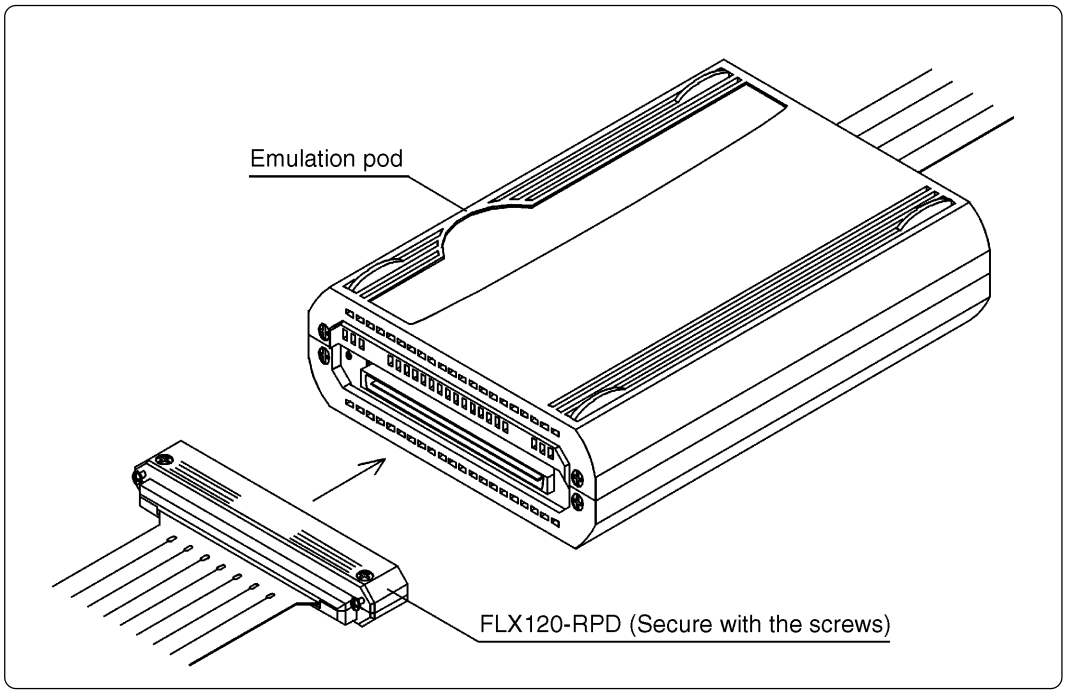


Figure 3.10 Connecting the emulation pod and FLX120-RPD

⚠ CAUTION

Note on Connecting the Cable:

- Always shut OFF power before connecting the cable. The power ON state could destroy internal circuits.

Note on Securing the Screws:

- After connecting the emulator main unit to the cable, be sure to secure the screws.

3.6 Connecting the Target System

There are seven ways available to connect the emulation pod to target systems as shown in Figure 3.11.

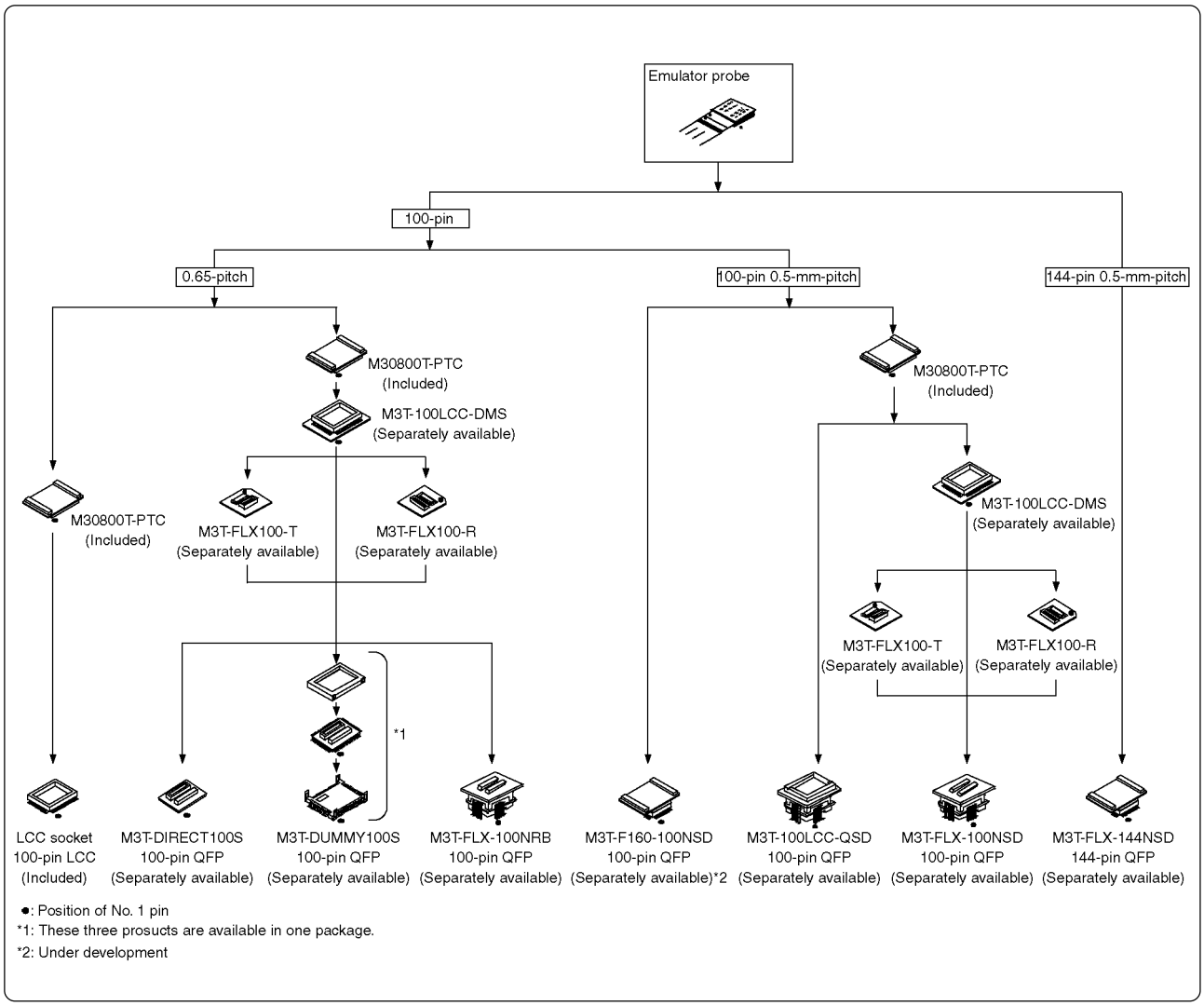


Figure 3.11 Connecting the emulation pod and target systems

⚠ CAUTION

Note on Connecting the Target System:

- Take care not to attach the converter board in a wrong direction. It may cause a fatal damage to the emulation pod.

(1) Connecting 100-pin LCC Socket

When connecting the emulation pod probe to the 100-pin LCC socket (Yamaichi Electronics Co., Ltd.: IC61-1004-051 etc.) on the target system, following the procedure below.

(1) Attach the CN2 side of the FLX160-PRB to the CN2 side of the M30800T-PTC.
(2) Attach the M30800T-PTC to the 100-pin LCC socket.

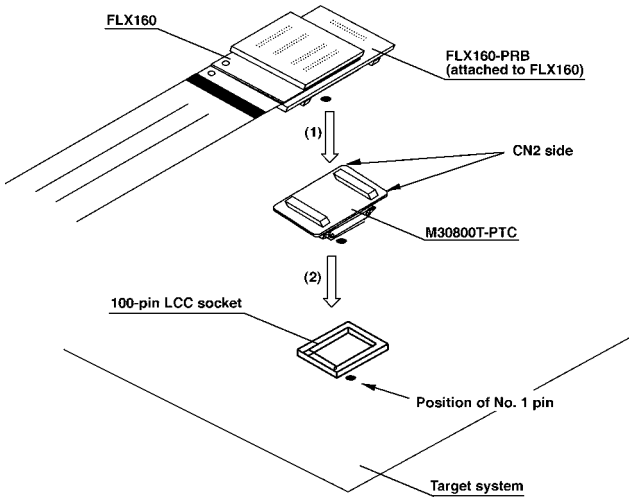


Figure 3.12 Connecting the emulation pod and 100-pin LCC socket

⚠ CAUTION

Notes on Connecting the Target System:

- Take care not to attach the converter board in a wrong direction. It may cause a fatal damage to the emulation pod.
- The small connectors of the M30800T-PTC are guaranteed for only 50 insertion/ removal iterations.
- For purchasing the IC61-1004-51 or for technical information, contact Yamaichi Electronics Co., Ltd. (http://www.yamaichi.co.jp/e/index.shtml)

(2) Connecting 100-pin 0.65-mm-pitch Foot Pattern (Part 1)

Figure 3.13 shows how to connect the emulation pod probe to the 100-pin 0.65-mm-pitch foot pattern on the target system with the M3T-DUMMY100S (not included), and here following is its procedure. For details on the M3T-100LCC-DMS and M3T-DUMMY100S, refer to each user's manual.

(1) Attach the M3T-DUMMY100S to the target system.
(2) Attach the M3T-100LCC-DMS to the M3T-DUMMY100S.
(3) Attach the M30800T-PTC to the FLX160-PRB.
(4) Attach the M30800T-PTC to the M3T-100LCC-DMS.

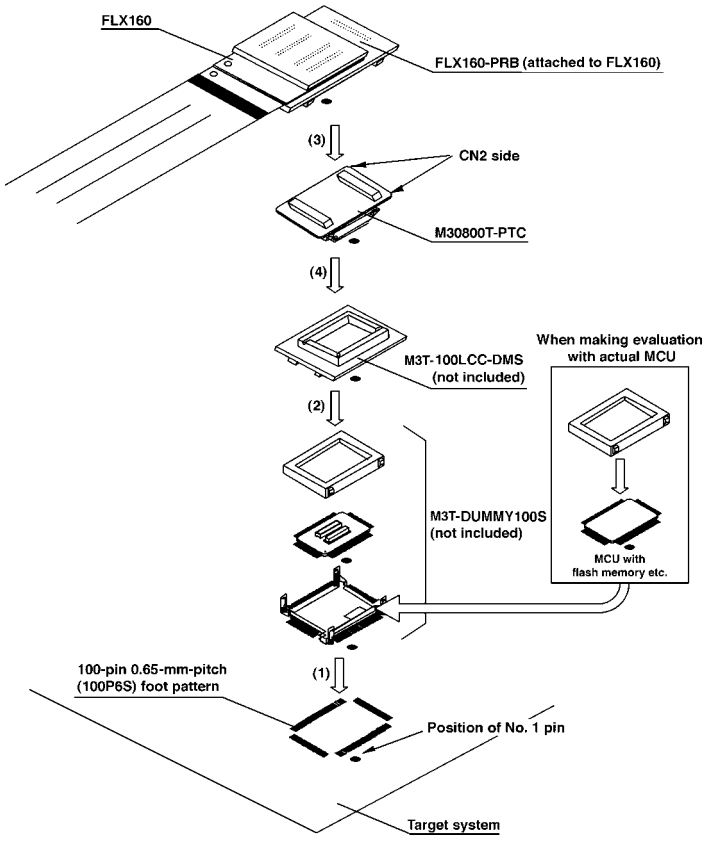


Figure 3.13 Connecting the emulation pod probe and 100-pin 0.65-mm-pitch foot pattern (part 1)

⚠ CAUTION

Notes on Connecting the Target System:

- Take care not to attach the converter board in a wrong direction. It may cause a fatal damage to the emulation pod.
- The small connectors of the M3T-100LCC-DMS and M3T-DUMMY100S are guaranteed for only 20 insertion/removal iterations.
- The small connectors of the M30800T-PTC are guaranteed for only 50 insertion/removal iterations.

(3) Connecting 100-pin 0.65-mm-pitch Foot Pattern (Part 2)

Figure 3.14 shows how to connect the emulation pod probe to the 100-pin 0.65-mm-pitch foot pattern on the target system with the M3T-DIRECT100S (not included), and here following is its procedure. For details on the M3T-100LCC-DMS and M3T-DIRECT100S, refer to each user's manual.

(1) Attach the M3T-DIRECT100S to the target system.
(2) Attach the M3T-100LCC-DMS to the M3T-DIRECT100S.
(3) Attach the M30800T-PTC to the FLX160-PRB.
(4) Attach the M30800T-PTC to the M3T-100LCC-DMS.

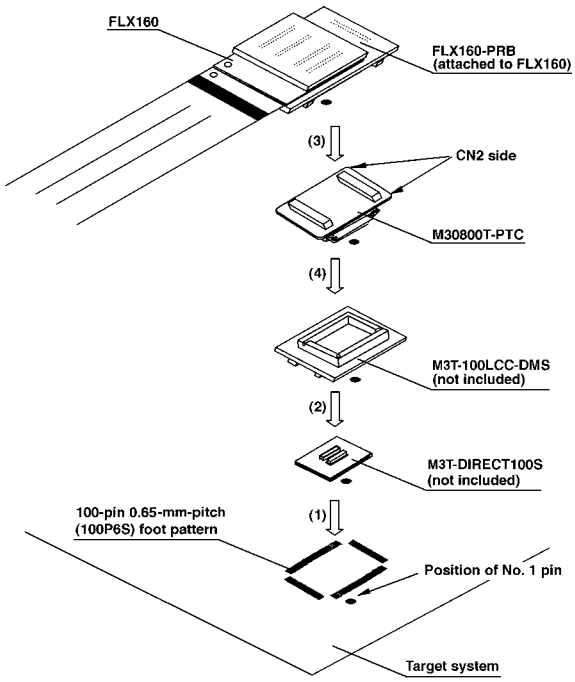


Figure 3.14 Connecting the emulation pod probe and 100-pin 0.65-mm-pitch foot pattern (part 2)

⚠ CAUTION

Notes on Connecting the Target System:

- Take care not to attach the converter board in a wrong direction. It may cause a fatal damage to the emulation pod.
- The small connectors of the M3T-100LCC-DMS and M3T-DIRECT100S are guaranteed for only 20 insertion/removal iterations.
- The small connectors of the M30800T-PTC are guaranteed for only 50 insertion/removal iterations.

(4) Connecting 100-pin 0.65-mm-pitch Foot Pattern (Part 3)

Figure 3.15 shows how to connect the emulation pod probe to the 100-pin 0.65-mm-pitch foot pattern on the target system with the M3T-FLX-100NRB (not included), and here following is its procedure. For details on the M3T-100LCC-DMS and M3T-FLX-100NRB, refer to each user's manual.

(1) Attach the M3T-FLX-100NRB to the target system.
For details on how to attach the M3T-FLX-100NRB to the target system, refer to its user's manual.
(2) Attach the M3T-100LCC-DMS to the M3T-FLX-100NRB.
(3) Attach the M30800T-PTC to the FLX160-PRB.
(4) Attach the M30800T-PTC to the M3T-100LCC-DMS.

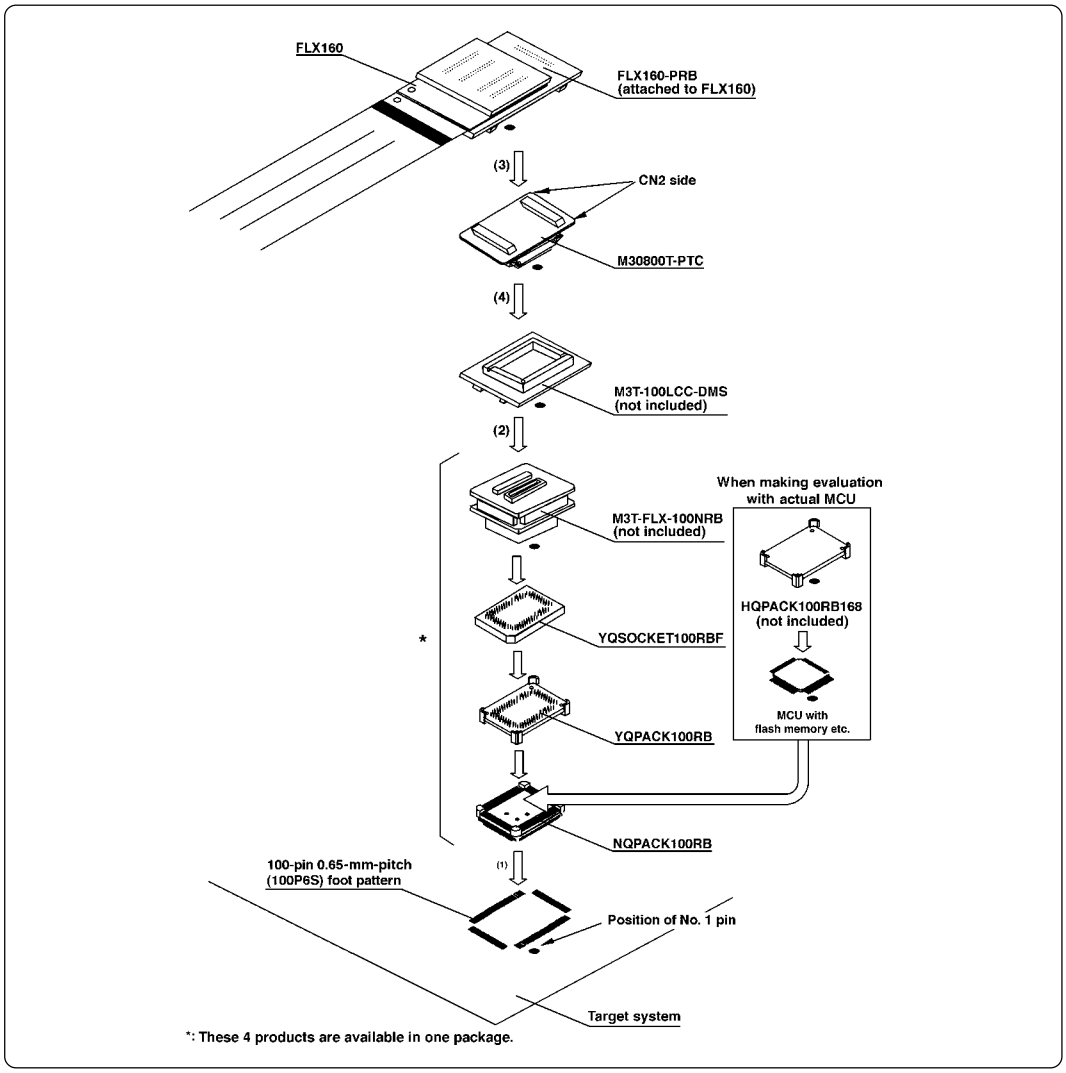


Figure 3.15 Connecting the emulation pod probe and 100-pin 0.65-mm-pitch foot pattern (part 3)

⚠ CAUTION

Notes on Connecting the Target System:

- Take care not to attach the converter board in a wrong direction. It may cause a fatal damage to the emulation pod.
- The small connectors of the M3T-100LCC-DMS and M3T-FLX-100NRB are guaranteed for only 20 insertion/removal iterations.
- The small connectors of the M30800T-PTC are guaranteed for only 50 insertion/removal iterations.

(5) Connecting 100-pin 0.5-mm-pitch Foot Pattern (Part 1)

Figure 3.16 shows how to connect the emulation pod probe to the 100-pin 0.5-mm-pitch foot pattern on the target system with the M3T-100LCC-QSD (not included), and here following is its procedure. For details on the M3T-100LCC-QSD, refer to its user's manual.

(1) Attach the M3T-100LCC-QSD to the target system.
For details on how to attach the M3T-100LCC-QSD to the target system, refer to its user's manual.
(2) Attach the M30800T-PTC to the FLX160-PRB.
(3) Attach the M30800T-PTC to the M3T-100LCC-QSD.

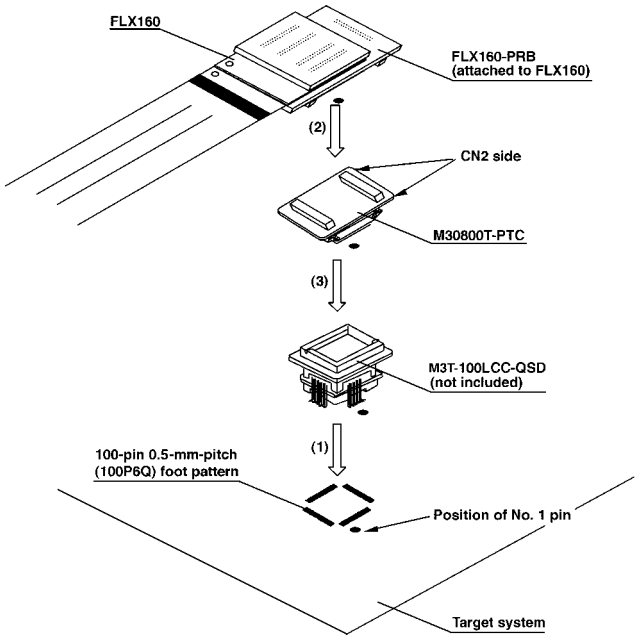


Figure 3.16 Connecting the emulation pod probe and 100-pin 0.5-mm-pitch foot pattern (part 1)

⚠ CAUTION

Notes on Connecting the Target System:

- Take care not to attach the converter board in a wrong direction. It may cause a fatal damage to the emulation pod.
- The small connectors of the M30800T-PTC are guaranteed for only 50 insertion/ removal iterations.

(6) Connecting 100-pin 0.5-mm-pitch Foot Pattern (Part 2)

Figure 3.17 shows how to connect the emulation pod probe to the 100-pin 0.5-mm-pitch foot pattern on the target system with the M3T-FLX-100NSD (not included), and here following is its procedure. For details on the M3T-100LCC-DMS and M3T-FLX-100NSD, refer to each user's manual.

(1) Attach the M3T-FLX-100NSD to the target system.
For details on how to attach the M3T-FLX-100NSD to the target system, refer to its user's manual.
(2) Attach the M3T-100LCC-DMS to the M3T-FLX-100NSD.
(3) Attach the M30800T-PTC to the FLX160-PRB.
(4) Attach the M30800T-PTC to the M3T-100LCC-DMS.

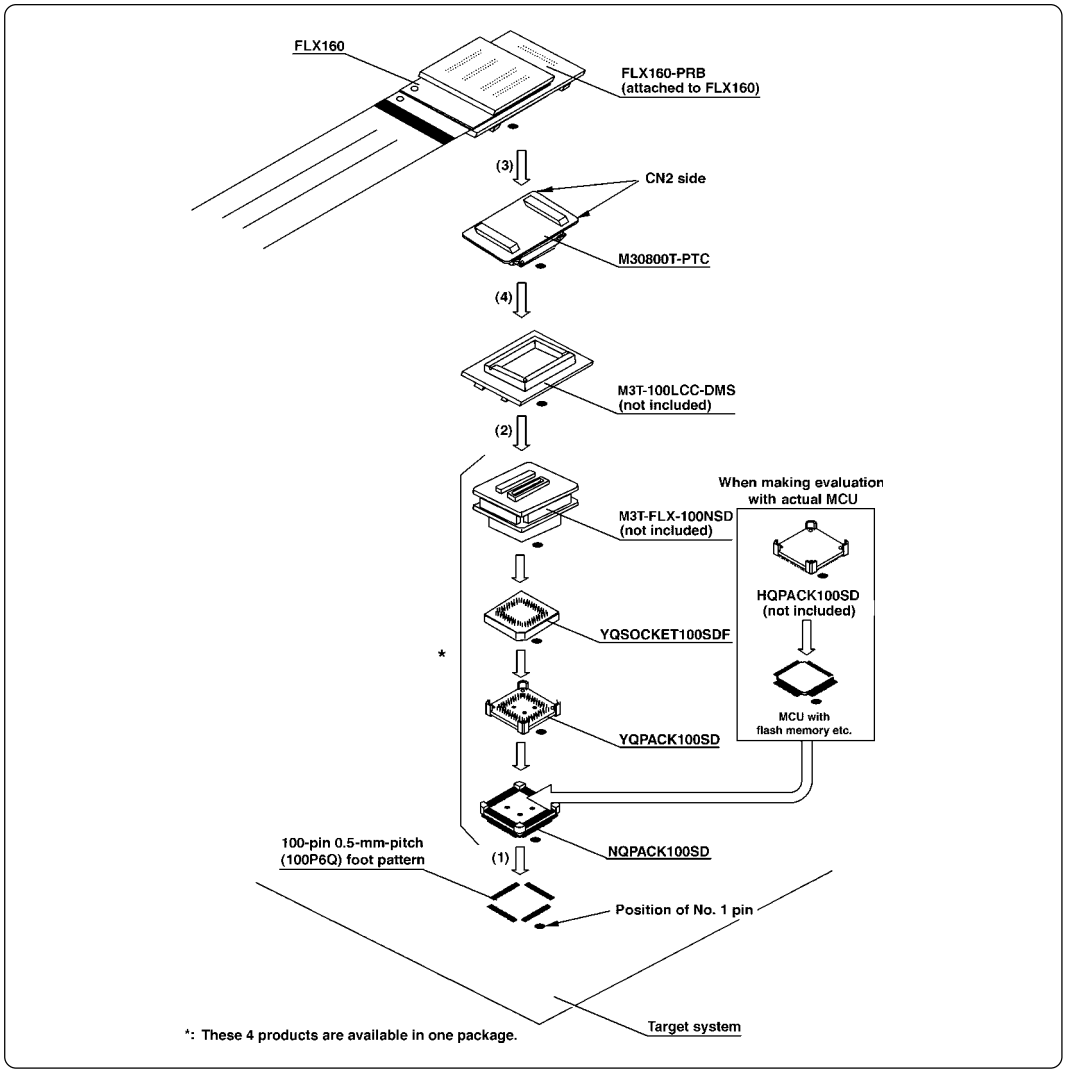


Figure 3.17 Connecting the emulation pod probe and 100-pin 0.5-mm-pitch foot pattern (part 2)

⚠ CAUTION

Notes on Connecting the Target System:

- Take care not to attach the converter board in a wrong direction. It may cause a fatal damage to the emulation pod.
- The small connectors of the M3T-100LCC-DMS and M3T-FLX-100NSD are guaranteed for only 20 insertion/removal iterations.
- The small connectors of the M30800T-PTC are guaranteed for only 50 insertion/removal iterations.

(7) Connecting 100-pin 0.5-mm-pitch Foot Pattern (Part 3)

Figure 3.18 shows how to connect the emulation pod probe to the 100-pin 0.5-mm-pitch foot pattern on the target system with the M3T-F160-100NSD (not included), and here following is its procedure.

(1) Attach the NQPACK100SD included with the M3T-F160-100NSD to the target system. For details on how to attach the M3T-F160-100NSD to the target system, refer to its user's manual.
(2) Attach the YQPACK100SD included with the M3T-F160-100NSD to the NQPACK100SD.
(3) Insert the included YQ-GUIDE's to the YQPACK100SD.
(4) Attach the FLX160-PRB to the M3T-F160-100NSD.
(5) Attach the M3T-F160-100NSD to the YQPACK100SD.

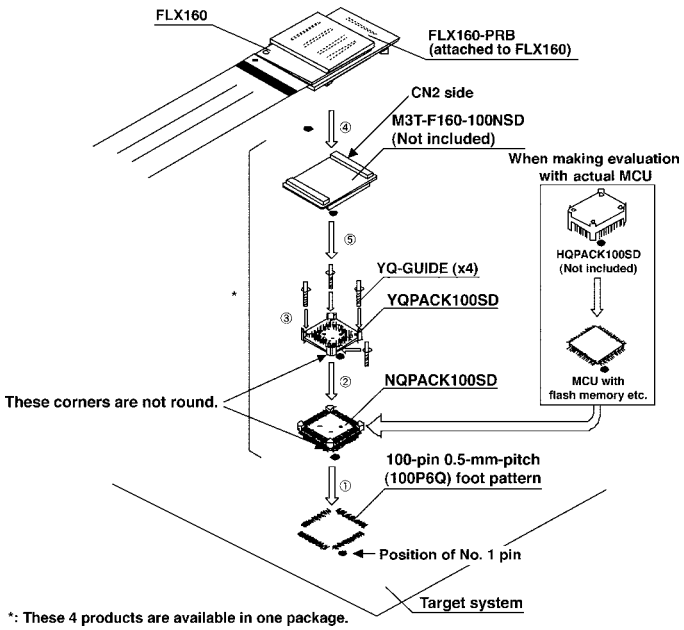


Figure 3.18 Connecting the emulation pod probe and 100-pin 0.5-mm-pitch foot pattern (part 3)

⚠ CAUTION

Notes on Connecting the Target System:

- Take care not to attach the converter board in a wrong direction. It may cause a fatal damage to the emulation pod.
- The small connectors of the M3T-F160-100NSD are guaranteed for only 50 insertion/removal iterations.

(8) Connecting 144-pin 0.5-mm-pitch Foot Pattern

Figure 3.19 shows how to connect the emulation pod probe to the 144-pin 0.5-mm-pitch foot pattern on the target system with the M3T-FLX-144NSD (not included), and here following is its procedure.

(1) Attach the NQPACK144SD (NQPACK, hereafter) included with the M3T-FLX-144NSD to the target system.
(2) Attach the YQPACK144SD (YQPACK, hereafter) included with the M3T-FLX-144NSD to the NQPACK, matching three holes of the NQPACK and YQPACK.
(3) Insert the included YQ-GUIDE's to the YQPACK.
(4) Attach the FLX160-PRB to the M3T-FLX-144NSD.
(5) Attach the M3T-FLX-144NSD to the YQPACK144SD.

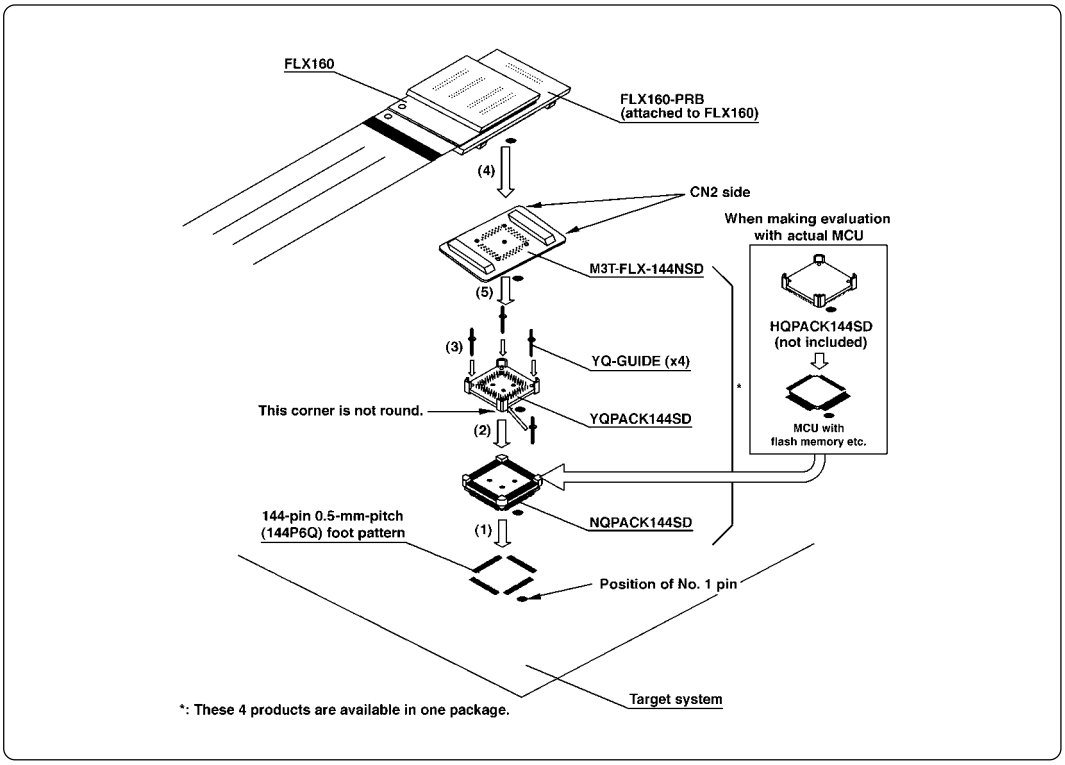


Figure 3.19 Connecting the emulation pod probe and 144-pin 0.5-mm-pitch foot pattern

⚠ CAUTION

Notes on Connecting the Target System:

- Take care not to attach the converter board in a wrong direction. It may cause a fatal damage to the emulation pod.
- The small connectors of the M3T-FLX-144NSD are guaranteed for only 50 insertion/removal iterations.

Chapter 4. Usage

This chapter describes from turning on the power of this product to starting up the emulator debugger.

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Chapter 4. Usage

4.1 Turning On the Power Supply

(1) Checking the Connection of the System

Before turning the power ON, check the connection of the PC4701, emulation pod, converter board and target system.

(2) Turning On the Power Supply

Power ON/OFF the target system and the PC4701 as simultaneously as possible.

⚠ CAUTION

Notes on Power Supply:

- The emulator's pin V_{CC} is connected to the target system in order to monitor target system voltage. For this reason, the emulator cannot supply power to the target system. Therefore, provide the target system with a separate power supply from that of the emulator.
- Keep target system power supply voltage within the MCU's specified range (3.0 to 3.6 V, 4.2 to 5.5 V).
- Do not change target system power supply voltage after power has been activated.

(3) LED Display When PC4701 Starts Up Normally

After the emulator starts up, check the status of the LEDs on the front panel to see whether emulation pod operation is enabled or not. Figure 4.1 shows front panel LED lighting status when the emulator is turned ON.

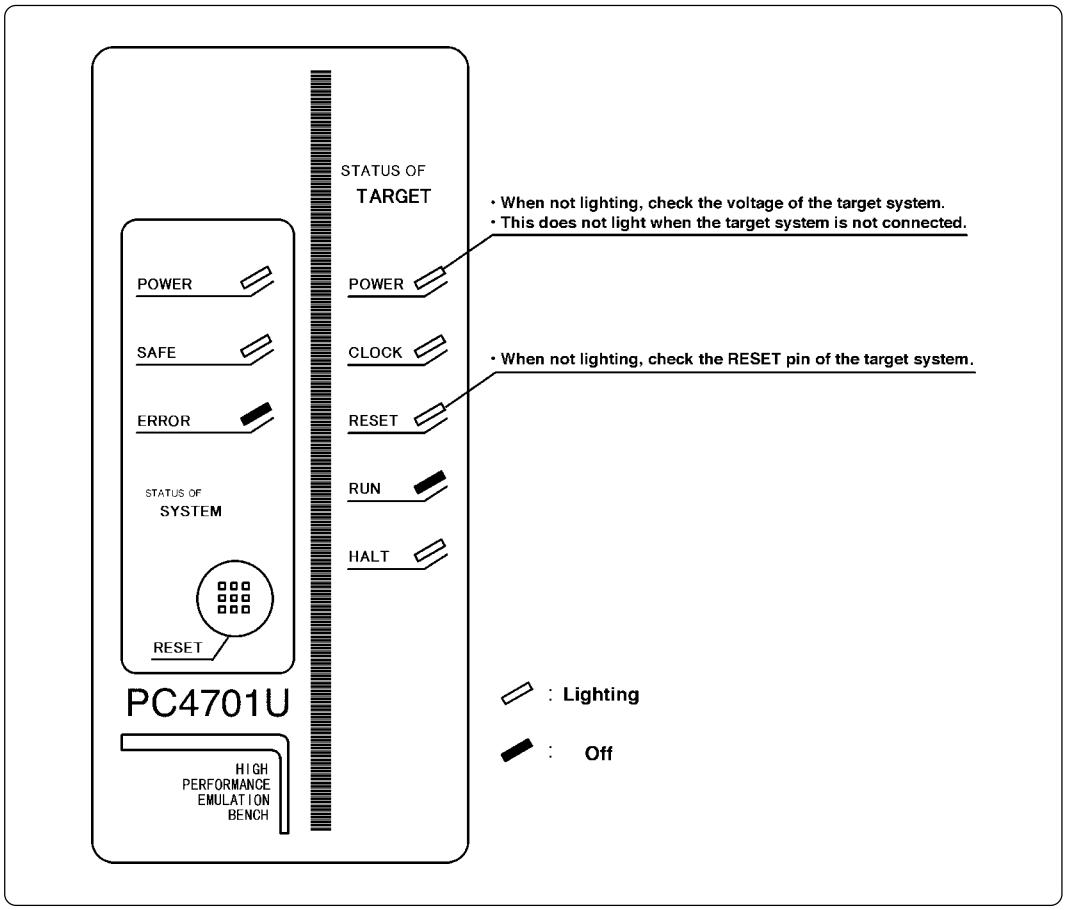

Figure 4.1 LED display when the power turned on

IMPORTANT

Note on Memory Expansion Mode and Microprocessor Mode:

- To use memory expansion or microprocessor mode, be sure to set pins RDY*, HOLD* and NMI* so that they are not active at startup. Otherwise the emulator system will not function correctly.

Note on CLOCK LED:

- If CLOCK LED does not turn on, check the following points:

  (1) Immediately after starting PC4701 (before starting the emulator debugger)

  --> Check if the oscillation circuit within the emulation pod oscillates normally.

  (2) After starting the emulator debugger (after setting the Init dialog box)

  --> Check the oscillation circuit set in the Init dialog box oscillates normally.

4.2 Downloading Firmware

(1) When It is Necessary to Download Firmware

It is necessary to download firmware when:

(1) you use this product for the first time
(2) the firmware has been upgraded
(3) the emulator debugger has been upgraded
(4) use this product with the PC4701 which was used with other emulation pod before

(2) Downloading Firmware in Maintenance Mode

Download the firmware in maintenance mode as explained here following. The target system must not be connected when downloading the firmware.

(1) Within 2 seconds of activating power to the emulator, press the RESET button on the emulator front panel. This will switch the emulator to maintenance mode.
(2) Start up the emulator debugger. When the Init dialog box setup is completed, the dialog which urges to download the firmware will appear. Download the firmware following messages. Required time for downloading the firmware depends on the connection of the interface.

- For USB interface: about 20 seconds
- For LPT parallel interface: about 20 seconds
- For dedicated parallel interface: about 30 seconds
- For serial interface: about 5 minutes

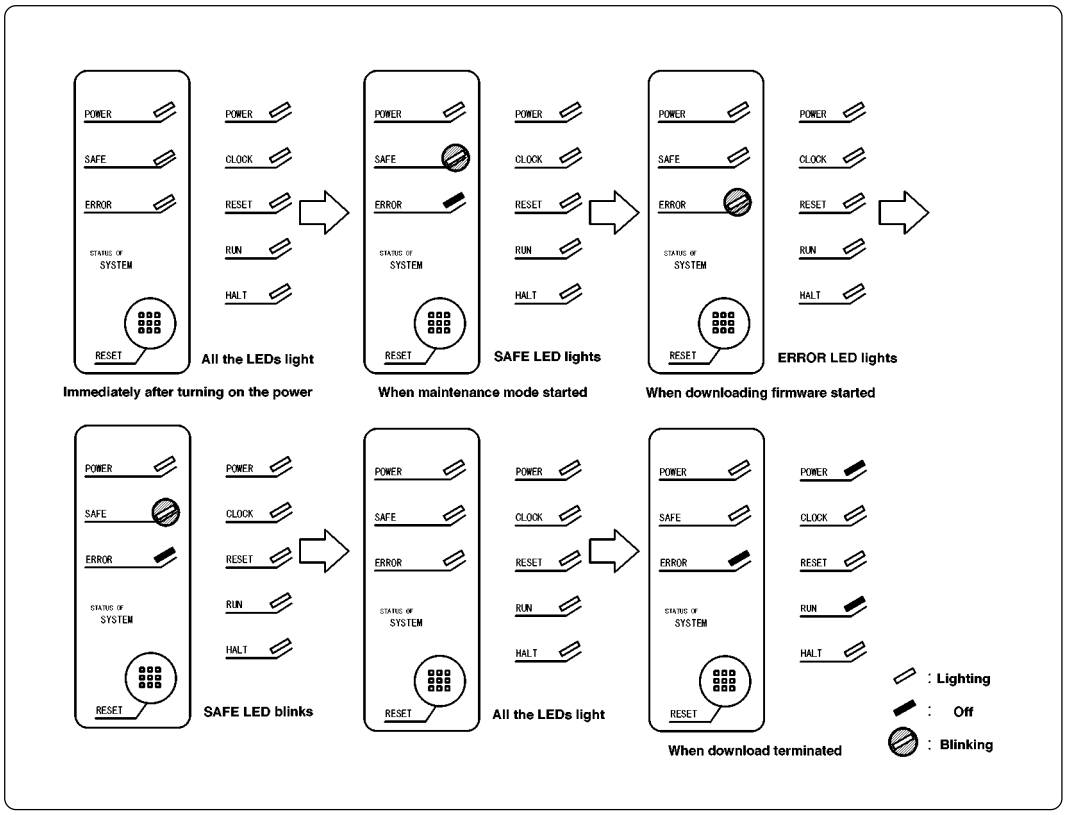

Figure 4.2 Downloading firmware in maintenance mode

IMPORTANT

Note on Downloading Firmware:

- Do not shut OFF power while the firmware is being downloaded. Doing so, the emulator will not start up properly. If power is shut OFF by mistake, redownload the firmware in maintenance mode.

4.3 Starting Up the Emulator Debugger (Setting EMEM Dialog Box)

The EMEM dialog box will appear after setting the Init dialog box by starting up the emulator debugger or completing downloading the firmware. Here explains how to set processor mode of the target MCU, allocate the emulation memory and set the emulator work area. Figure 4.3 shows the EMEM dialog box display.

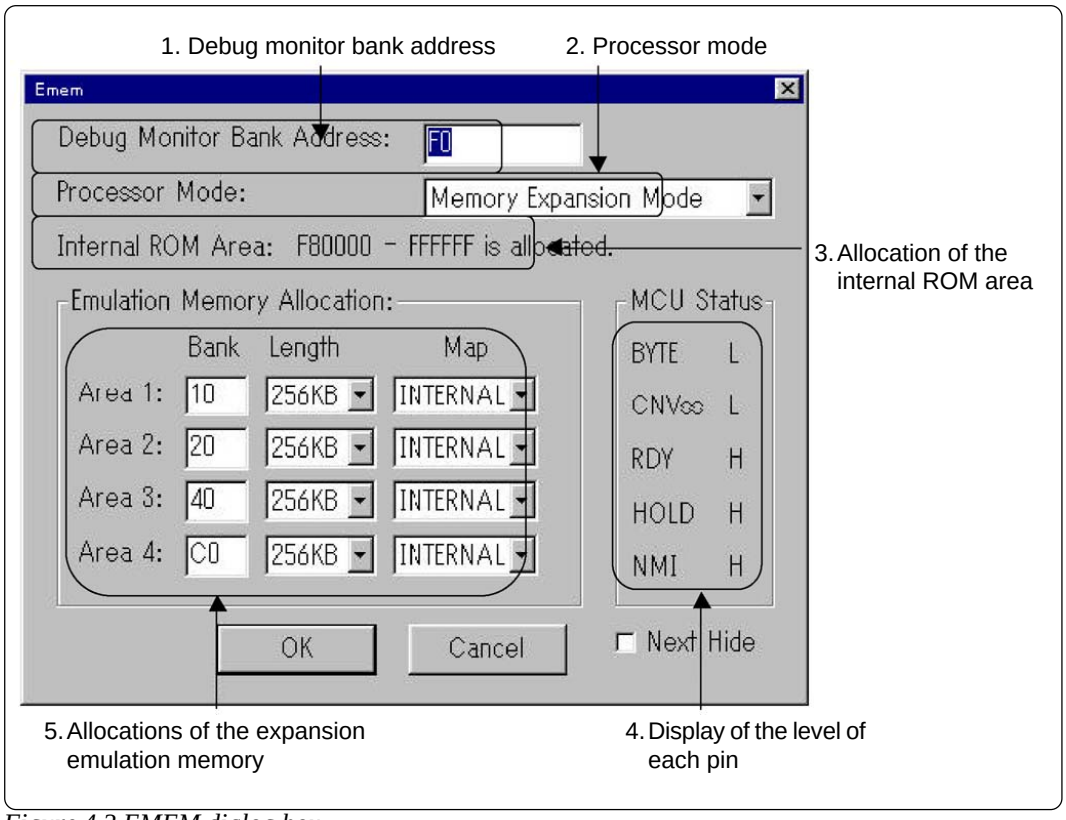

Figure 4.3 EMEM dialog box

(1) Setting the Debug Monitor Bank Address

With this product, 64 consecutive KB of the emulator's work area are allocated to the debug monitor. When "F0" is specified, 64 KB starting from address F00000h are allocated for use by the debug monitor. Specify an unused area.

IMPORTANT

Notes on Setting Debug Monitor Bank Address:

- It is not possible to view or set the content of the specified area. Even on the dump window or in the reverse assemble area of the program/source windows, the content of this area is not displayed correctly though it can be displayed.
- The below bank addresses cannot be set for the debug monitor.

  (1) MCU internal resources (RAM/SFR area)
  (2) DRAM area or multiplex area
  (3) Interrupt vector area

(2) Selecting Processor Mode

Here explains about the setting of processor mode. Selectable modes are listed in Table 4.1.

Table 4.1 Selecting processor mode

Processor mode	Select from the list
Single-chip mode	Single-chip Mode
Memory expansion mode	Memory Expansion Mode
Microprocessor mode	Microprocessor Mode

(3) Setting the Emulation Memory

This product has two kinds of emulation memory and how to allocate is different depending on which processor mode is selected. Table 4.2 shows how to set the emulation memory for each processor mode.

Table 4.2 Setting the emulation memory

Processor mode	Emulation memory for internal ROM	Emulation memory for expansion area
Single-chip Mode	The area F80000h-FFFFFFh is allocated automatically.	Cannot be used.
Memory Expansion Mode	The area F80000h-FFFFFFh is allocated automatically.	Possible to specify the desired area between Areas 1 through 4.
Microprocessor Mode	Cannot be used.	Possible to specify the desired area between Areas 1 through 4.

IMPORTANT

Notes on Selecting Processor Mode:

- When setting single-chip mode or memory expansion mode, the level of pin CNVss of the target system should be "L".
- When setting microprocessor mode, the level of pin CNVss of the target system should be "H".
- When setting memory expansion mode or microprocessor mode, pins RDY* and HOLD* of the target system should be "H".

Note on Emulation Memory for Internal ROM:

- For the emulation memory for the internal ROM, the ROM area specified in the MCU file of the emulator debugger is valid. This product can expand this area up to 1 MB (F00000h - FFFFFFh).

  For "M30835.MCU", "F80000h - FFFFFFh" is valid. For details on the MCU files, refer to the user's manual of the emulator debugger.

(4) Emulation Memory Allocation as Expansion Area

This section explains about setting emulation memory for expansion purposes in the memory expansion mode and microprocessor mode. To use emulation memory as expansion area, set memory allocation as indicated here below. Emulation memory specifications are given in Table 4.3.

(1) Setting bank address (Bank): Specify the bank address of the area to be allocated for expansion as a hexadecimal number.

For example, specifying "C0" allocates the bank from address C00000h.
When 256 KB is specified as the Length, bank addresses can be specified in 256KB blocks up to 00, 04, 08 and - FC.
When 1 MB is specified as the Length, bank addresses can be specified in 1MB blocks up to 00, 10, 20 and - F0.

(2) Specifying area size (Length): Specify the size of the specified expansion area. The area from the specified address to the size specified here is allocated as external area or internal area. Length can be specified as 256 KB or 1 MB.

(3) Specifying area map (Map): Select whether the specified area is to be allocated as internal area (used as emulation memory) or external area (used by external device, etc.).

- When INTERNAL is specified: This bank is allocated as internal area and used for expansion.
- When EXTERNAL is specified: This bank is allocated as external area and used by the target system as an external resource.
- When No Use is specified: This bank is allocated as external area and used by the target system as an external resource.

Areas not specified here are allocated as external area. The only difference from the area specified as EXTERNAL area is download speed. Download to the area specified as EXTERNAL area is faster than to other areas.

IMPORTANT

Notes on Using Emulation Memory for Expansion:

- When the single-chip mode or memory expansion mode is set by specifying processor mode, emulation memory is automatically allocated to the internal ROM area. Therefore, it is not necessary to deliberately specify emulation memory as expansion area in order to allocate the internal ROM area.
- The 1.5MB memory mounted in the product can be allocated out. Set memory allocation so that the total of the 4 length values does not exceed the emulation memory size (1.5 MB).
- Be careful that the specified areas do not overlap one another.
- Do not set the following areas for memory allocation of the MCU. Set these areas referring the specifications of the MCU.

  (1) Area allocated for DRAM connection
  (2) Area allocated for multiplex bus
  (3) Unusable area
- Emulation pod memory is automatically selected as reset vector area regardless of settings.
- Except for the SFR, RAM, ROM and internally reserved areas, all areas other than the set area are externally accessible.
- MCU internal resources are automatically selected as SFR and RAM areas regardless of settings.

Table 4.3 Specifications of expansion emulation memory

Maximum operating frequency	20 MHz, 1 wait
Number of areas which can be set	Max. 4 areas
Area size	Successive 256 KB or 1 MB
Emulation memory size	Total of 4 areas: 1.5 MB
Possible bank to be set	(1) For area size 256 KB X0h, X4h, X8h, XCh bank e.g.) 20 bank, 64 bank, A8 bank, EC bank etc. (2) For area size 1 MB X0h bank e.g.) 20 bank, 40 bank, 80 bank, A0 bank etc.
Possible combinations of areas	(1) 256 KB (2) 256 KB + 256 KB (3) 256 KB + 256 KB + 256 KB (4) 256 KB + 256 KB + 256 KB + 256 KB (5) 1 MB (6) 1 MB + 256 KB (7) 1 MB + 256 KB + 256 KB (8) None

IMPORTANT

Notes on Memory Access:

- When setting processor mode to the memory expansion mode, it may be changed to the memory expansion mode temporarily before the user program itself changes from the single-chip mode to the memory expansion mode. Take due consideration on this phenomenon in the following cases:

  (1) Immediately before executing the program after setting a software break
  (2) Immediately after stopping the program when a software break is set

- To refer to or change the contents of emulation memory for expansion, its processor mode should be either memory expansion mode or microprocessor mode. In memory expansion mode, after the emulator debugger starts or it is reset, processor mode shifts to single-chip mode automatically, therefore, you need to change processor mode bit using a memory window or others.

(5) Referring MCU STATUS

It is possible to confirm each level of pins BYTE, CNVss, RDY*, HOLD* and NMI* on the target system.

IMPORTANT

Notes on MCU STATUS:

- The status of pins of MCU is displayed in the "MCU STATUS" of the EMEM dialog box. Confirm if it matches with processor mode.
- Check that "RDY", "HOLD" and "NMI" are set to "H". If they are set to the "L" level, the MCU itself is in the standby state. The emulator debugger displays an error message because it receives no response from the MCU.

4.4 Self-check

(1) Self-check Procedure

To run the emulator self-check, do so as explained here below. While the self-check is in progress, LEDs will change as shown in Figure 4.5.

(1) Set the switches in the emulation pod same as the factory setting (see Figure 4.4).
(2) If the target system is connected, disconnect the target system.
(3) Within 2 seconds of activating power to the emulator, press the RESET button on the emulator front panel to switch the emulator to maintenance mode.
(4) Check the "SAFE" LED starts flashing and then press the RESET button again.
(5) The self-check will start. If the normal result is displayed in about 1 minute, the self-check terminated normally.

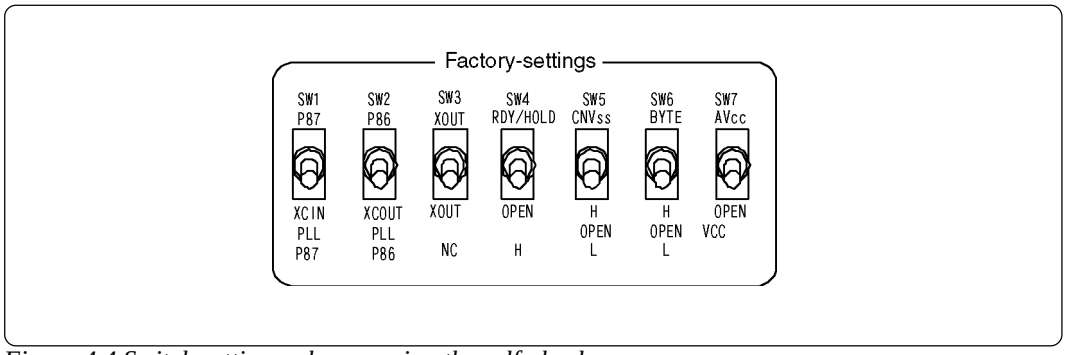

Figure 4.4 Switch settings when running the self-check

(2) If an Error is Detected in Self-check

If the self-check does not result normally (ERROR 1 or ERROR 2 shown in Figure 4.5), check the following.

- Check the connection of the emulation pod and the PC4701.
- Redownload the proper firmware.
- Check if the switches in this product is set same as the factory-setting ("Figure 3.2 Positions of the switches and their factory-settings" on page 25).

IMPORTANT

Note on Self-check:

- If the self-check does not result normally (excluding target system errors), the emulation pod may be damaged. Contact your local distributor.

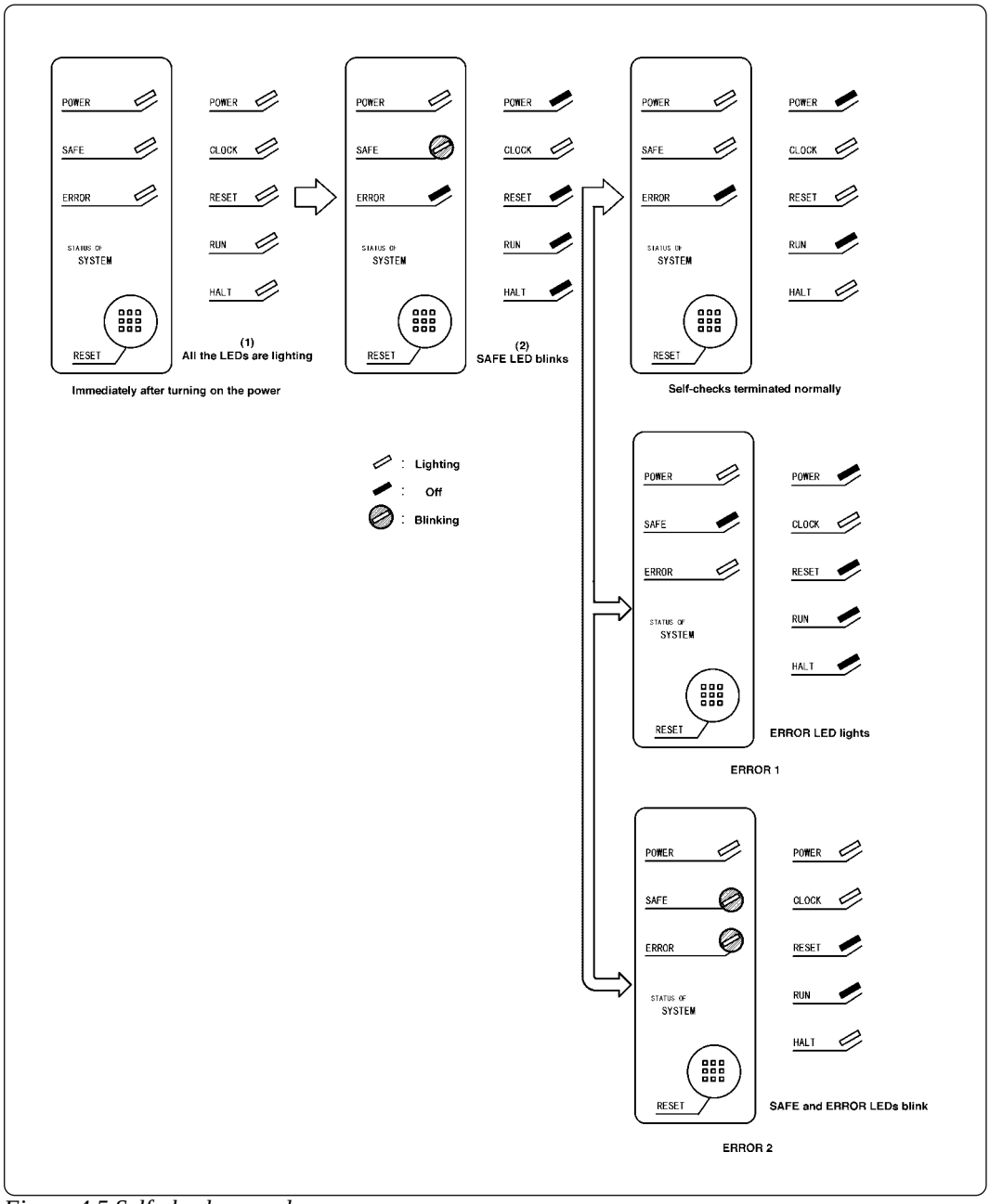

Figure 4.5 Self-check procedure

Chapter 5. Specifications

This chapter describes specifications of this product.

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Chapter 5. Specifications

5.1 Specifications

Table 5.1 lists the specifications of the M30830T-RPD-E.

Table 5.1 Specifications of the M30830T-RPD-E

Emulator	PC4701 (excluding PC4700L and PC4701L)	
Applicable MCUs	M30833MJFP/M30833FJFP (100-pin 0.65-mm) M30833MJGP/M30833FJGP*1 (100-pin 0.5-mm) M30835MJGP/M30835FJGP*1 (144-pin 0.5-mm) Planning to support M32C/81, M32C/82 Group MCUs	
Evaluation MCU	M30835FJGP (two pieces) RAM: 31 KB	
Usable modes	Single-chip mode Memory expansion mode Microprocessor mode	
Emulation memory	(1) 1 MB for internal ROM of MCU Fixed F80000h - FFFFFFh*2 (Possible to expand up to F00000h - FFFFFFh) Maximum operating frequency: 20 MHz, 0 wait (2) 1.5 MB (changeable) for expansion area Possible to allocate by 256 KB or 1 MB Maximum operating frequency: 20 MHz, 1 wait)	
Maximum operating frequency	20 MHz (operating voltage: 3.0 to 3.6 V, 4.2 to 5.5 V, divide-by-1)	
Clock supply	X_{IN}-X_{OUT}	Internal oscillator circuit board (OSC-3) Switchable to external oscillator input
	X_{CIN}-X_{COUT}	Internal oscillator circuit board (32.768 kHz fixed) Switchable to external oscillator input
Operating frequency	3.0 to 3.6 V, 4.2 to 5.5 V	
Operating temperature	5 to 35°C (no dew)	
Storage temperature	-10 to 60°C (no dew)	
Power supply to emulation pod	Supplied from PC4701	
Connection to target system (see 3.6 "Connecting the Target System" on page 36)	**For 144-pin 0.5-mm-pitch LQFP (144P6Q-A):** M3T-FLX-144NSD (not included) **For 100-pin 0.5-mm-pitch LQFP (100P6Q-A):** (1) M30800T-PTC (included) + M3T-100LCC-QSD (not included) (2) M30800T-PTC (included) + M3T-100LCC-DMS (not included) + M3T-FLX-100NSD (not included) (3) M3T-F160-100NSD (not included) **For 100-pin 0.65-mm-pitch QFP (100P6S-A):** (1) M30800T-PTC (included) + M3T-100LCC-DMS (not included) + M3T-FLX-100NRB (not included) (2) M30800T-PTC (included) + M3T-100LCC-DMS (not included) + M3T-DUMMY100S (not included) (3) M30800T-PTC (included) + M3T-100LCC-DMS (not included) + M3T-DIRECT100S (not included) **For 100-pin LCC socket:** M30800T-PTC (included)	
Overseas standards	• U.S. EMI standards (FCC part 15 Class A) • CE marking (EN55022, EN50082-1)	

*1 Converter board (separately available) is required.
*2 ROM area specified in the MCU file is valid.

5.2 Connection Diagram

Figures 5.1 and 5.2 show the connection diagram of the M30830T-RPD-E. This connection diagram mainly shows the interface section, and the circuits which are not connected to the target system such as the emulator's control system are omitted.

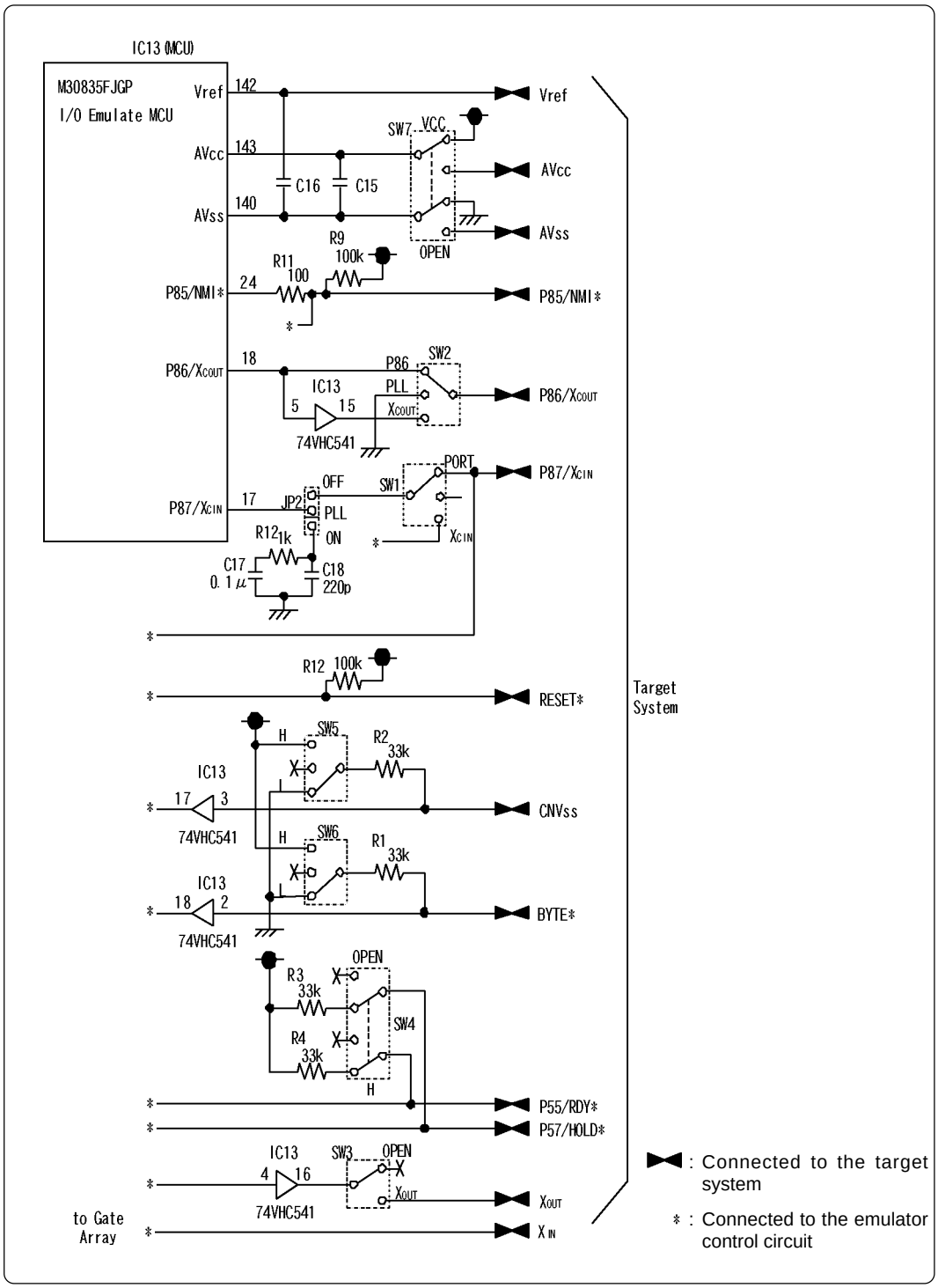

Figure 5.1 Connection diagram 1/2

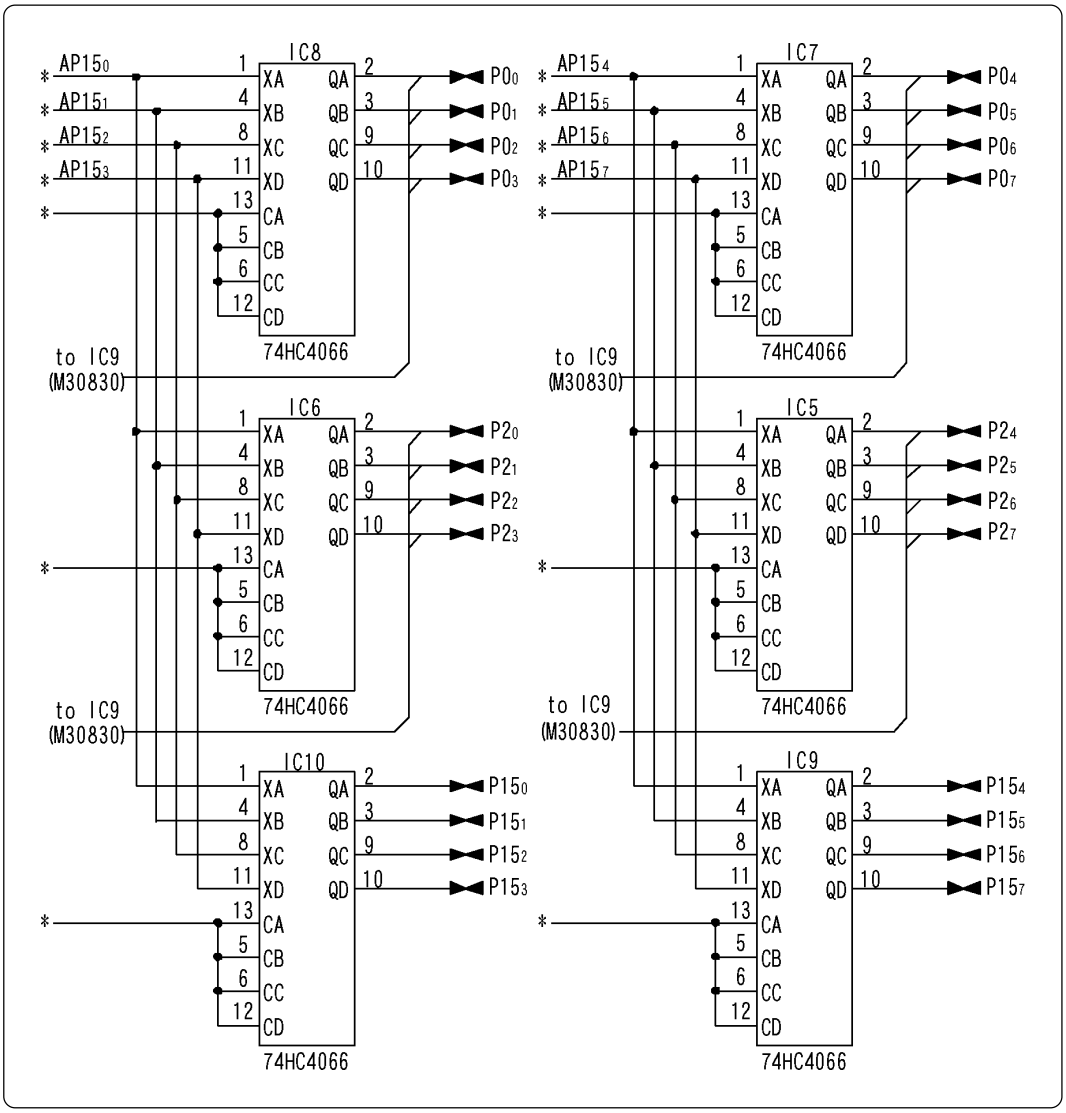

Figure 5.2 Connection diagram 2/2

Table 5.2 Electric characteristics of Xin input part (Gate Array) from the target system

Symbol	Parameter	Measuring condition	Standard values			Unit
		Vcc	Min.	Standard	Max.	
V_{IHC}	Input voltage	4.75	0	-	1.42	V
		5.25	3.68	-	5.25	

5.3 Operation Timing in Memory Expansion Mode and Microprocessor Mode

As there are a flexible cable and other devices between this product and the target system, I/O timing will differ from that of the actual MCU. Use the following as a reference when using the emulation pod.

(1) The output signals (address, RD*, WR*, etc.) of the evaluation MCU mounted on this product is output delayed by about 4 ns.

(2) It takes longer time to setup the data than the actual MCU by about 8 ns.

5.4 Electrical Characteristics

Table 5.3 shows IC electrical characteristics of the user interface. Use this as a reference when using the emulator.

Table 5.3 Electrical characteristics of port P15 (TC74HC4066)

Symbol	Parameter	Measuring condition	Standard values			Unit
		Vcc	Min.	Standard	Max.	
R_{ON}	ON resistor	2.0	-	160	-	Ω
		4.5	-	70	100	
$\triangle R_{ON}$	ON resistor difference	4.5	-	10	-	
I_{IN}	Switch input leak current	12.0	-	-	±100	nA

5.5 External Dimensions

(1) External Dimensions of the Emulation Pod

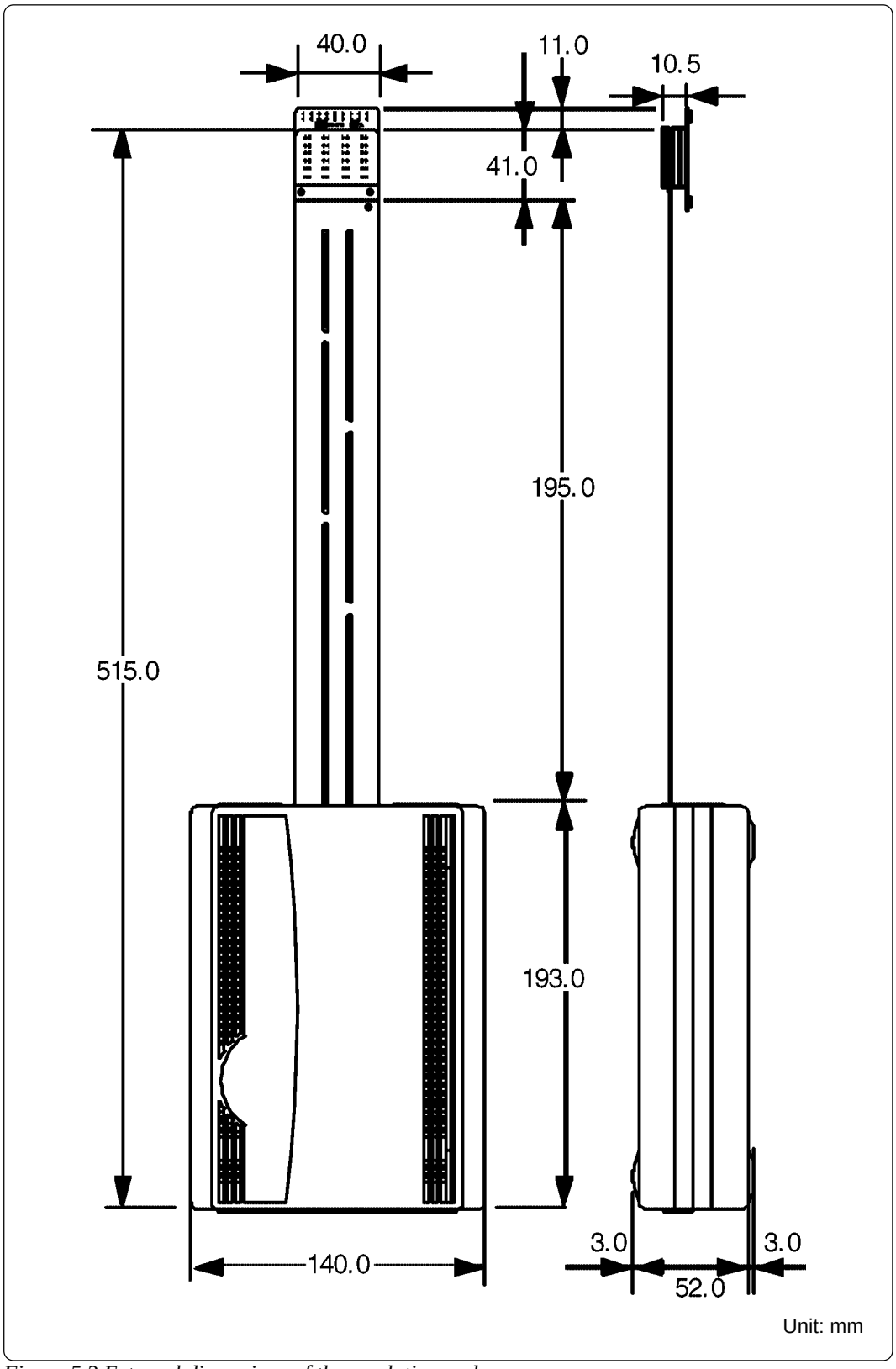

Figure 5.3 External dimensions of the emulation pod

(2) External Dimensions of the Converter Board (M30800T-PTC)

Figure 5.4 shows the external dimensions of the converter board M30800T-PTC for 100-pin QFP (100P6N).

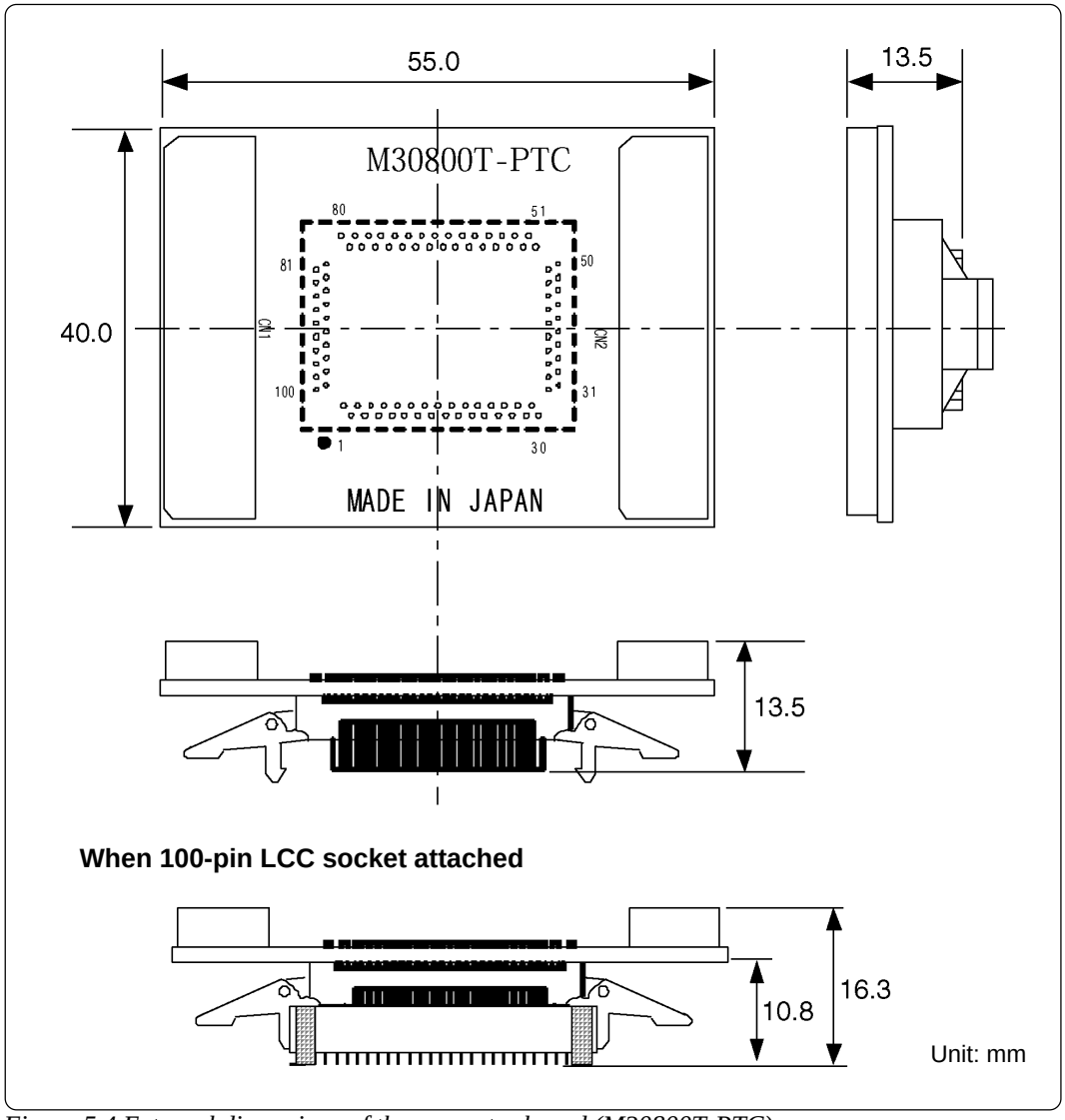

Figure 5.4 External dimensions of the converter board (M30800T-PTC)

(3) External Dimensions of the Converter Board (M3T-FLX-144NSD)

Figure 5.5 shows the external dimensions and the foot pattern of the converter board M3T-FLX-144NSD for 144-pin LQFP (144P6Q).

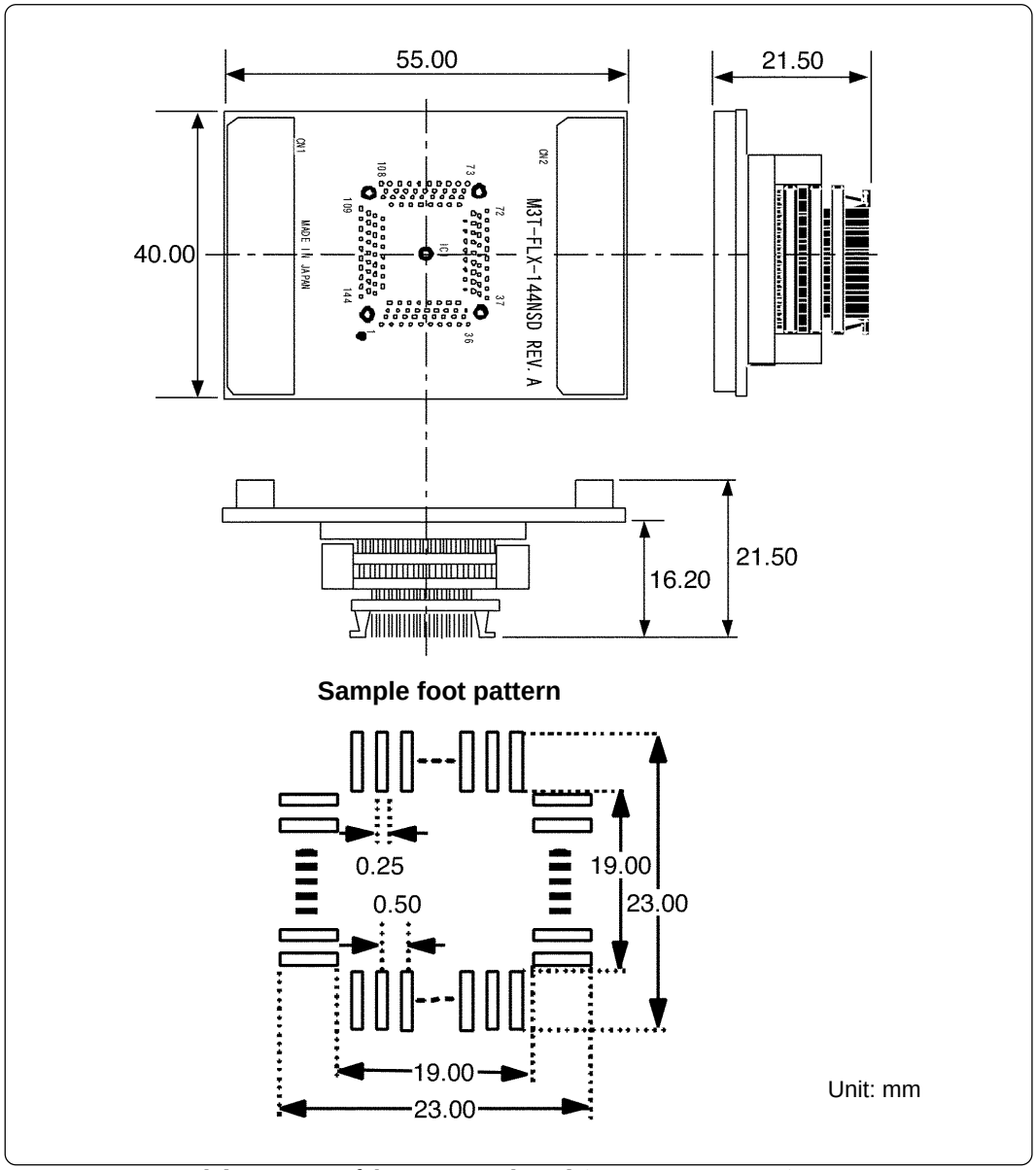

Figure 5.5 External dimensions of the converter board (M3T-FLX-144NSD)

Chapter 6. Troubleshooting

This chapter describes how to troubleshoot when this product does not work properly.

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6.2 When the Emulator Debugger Does Not Start Up Properly 65

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(4) Errors Occur When the Emulator Debugger Starts Up (When the target system is connected) 67

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(1) When the A-D Conversion Values are Different from Expected Values 67

Chapter 6. Troubleshooting

6.1 Flowchart to Remedy the Troubles

Figure 6.1 shows the flowchart to remedy the troubles from when power to the emulator is activated until the emulator debugger starts up. Check this while the target system is disconnected. For the latest FAQs visit the following URL.

http://www.renesas.com/en/tools

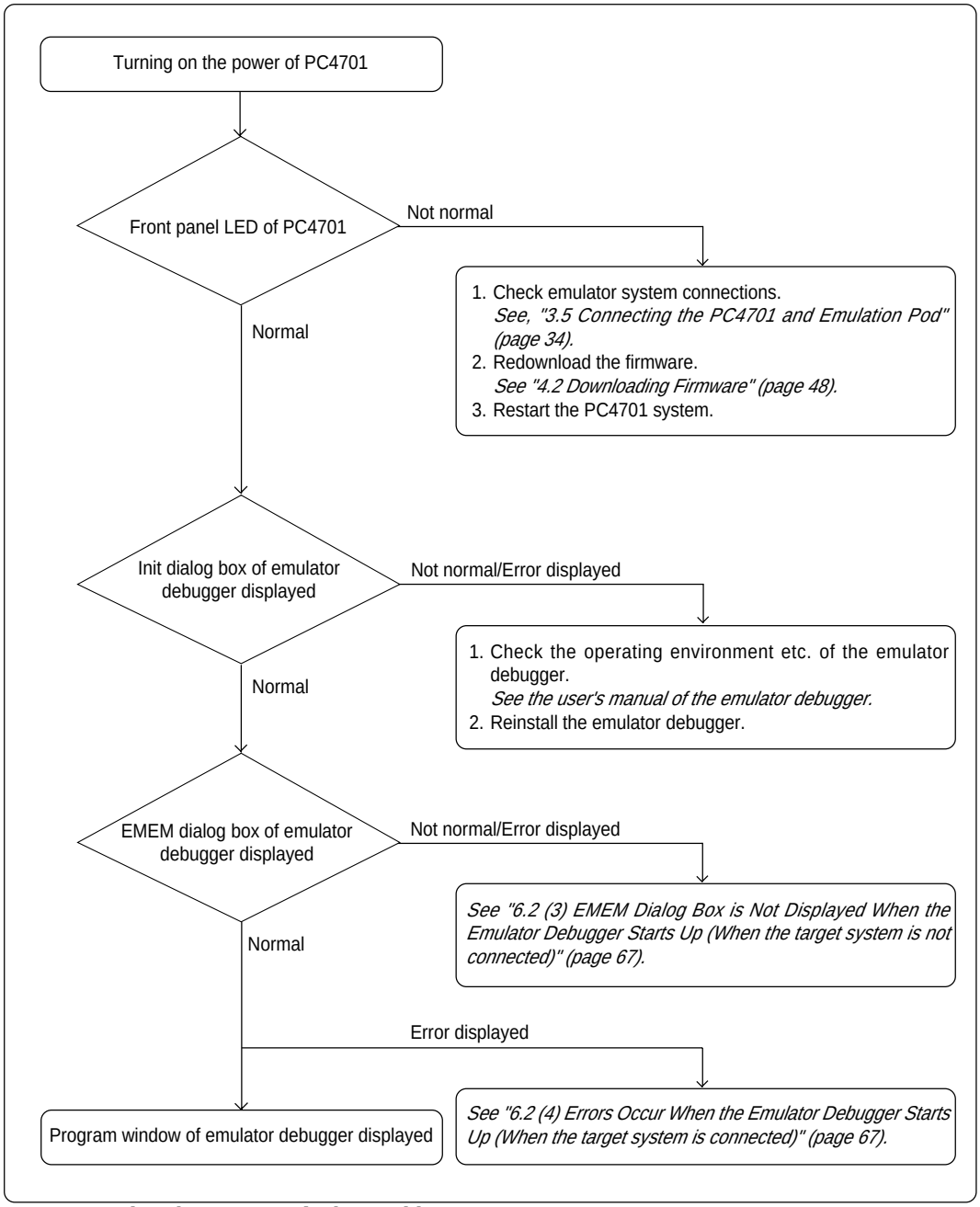
Turning on the power of PC4701
Front panel LED of PC4701
Not normal
1. Check emulator system connections.
See, "3.5 Connecting the PC4701 and Emulation Pod" (page 34).
2. Redownload the firmware.
See "4.2 Downloading Firmware" (page 48).
3. Restart the PC4701 system.
Normal
Init dialog box of emulator debugger displayed
Not normal/Error displayed
1. Check the operating environment etc. of the emulator debugger.
See the user's manual of the emulator debugger.
2. Reinstall the emulator debugger.
Normal
EMEM dialog box of emulator debugger displayed
Not normal/Error displayed
See "6.2 (3) EMEM Dialog Box is Not Displayed When the Emulator Debugger Starts Up (When the target system is not connected)" (page 67).
Normal
Error displayed
Program window of emulator debugger displayed
See "6.2 (4) Errors Occur When the Emulator Debugger Starts Up (When the target system is connected)" (page 67).

Figure 6.1 Flowchart to remedy the troubles

6.2 When the Emulator Debugger Does Not Start Up Properly

(1) When the LED Display of PC4701 is Abnormal

Table 6.1 LED's abnormal display and its checkpoints

Error	Connection to the target system	Checkpoint
LEDs do not light up.	-	Recheck the power cable is connected to the PC4701. *See the instruction manual of the PC4701.*
All LEDs remain lit.	-	Recheck the connection between the PC4701 and this product. *See "3.5 Connecting the PC4701 and Emulation Pod" (page 34).*
The POWER LED of "STATUS OF TARGET" does not light up.	Connected	Check power is properly supplied to the target system and the target system is properly grounded.
The CLOCK LED of "STATUS OF TARGET" does not light up.	Disconnected	(1) Check both the main and sub-clocks of the emulator debugger are not set to "EXT". *See the CLK command of the emulator debugger.* (2) Check the oscillation circuit in the emulation pod is oscillating. *See "3.3 Selecting Clock Supply" (page 29).*
	Connected	(1) Check the oscillation circuit in the target system is oscillating. (2) Check the switches in the emulation pod are correctly set. *See "3.2 Switch Settings" (page 25).*
The RESET LED of "STATUS OF TARGET" does not go out.	Connected	Check the reset pin of the target system is pulled up.

(2) EMEM Dialog Box is Not Displayed When the Emulator Debugger Starts Up (When the target system is connected)

Table 6.2 Checkpoints of errors when starting up the emulator debugger (target is connected)

Error	Checkpoint
Communication error occurred. Data was not sent to the target.	Check all emulator debugger settings, interface cable settings and switches on the rear of the PC4701 match. *See the instruction manuals of the PC4701 and emulator debugger.*
Target system cannot be properly built.	(1) Download the proper firmware. *See "4.2 Downloading Firmware" (page 48).* (2) Recheck the connection between the PC4701 and this product. *See "3.5 Connecting the PC4701 and Emulation Pod" (page 34).*
PD308 version is not the same version as the firmware in the target.	Download the proper firmware. *See "4.2 Downloading Firmware" (page 48).*
Target MCU is in the reset state.	(1) Check if the reset pin of the target system is pulled up. (2) Check if the reset pin of the target system has changed from "L" to "H" level.
Target MCU cannot be reset.	(1) Check pin NMI* is held high. (2) If in memory expansion mode or microprocessor mode, check pins RDY* and HOLD* are "H" level. (3) If the reset circuit of the target system has a watchdog timer, disable the timer. (4) Check power is properly supplied to the target system and that the target system is properly grounded. (5) The program may be uncontrollable in areas where memory is not allocated. Recheck the map setting. *See "4.3 Starting Up the Emulator Debugger (Setting EMEM Dialog Box)" (page 49).*
Target is in "HOLD" state.	(1) The MCU is either in the stop mode or wait mode. Either reset the MCU or cancel the mode with an interrupt. *See MCU specifications.* (2) The program may be uncontrollable in areas where memory is not allocated. Recheck the map setting. *See "4.3 Starting Up the Emulator Debugger (Setting EMEM Dialog Box)" (page 49).*
Target clock is stopped.	(1) Check the oscillation circuit of the target system is oscillating properly. (2) Check the switches in the emulation pod are correctly set. *See "3.2 Switch Settings" (page 25).*
Target MCU is not receiving power.	Check power is properly supplied to the target system and that the target system is properly grounded.

(3) EMEM Dialog Box is Not Displayed When the Emulator Debugger Starts Up (When the target system is not connected)

Table 6.3 Checkpoints of errors when starting up the emulator debugger (target is not connected)

Error	Checkpoint
Communication error occurred. Data was not sent to the target.	Check all emulator debugger settings, interface cable settings and switches on the rear of the PC4701 match. *See the instruction manuals of the PC4701 and emulator debugger.*
Target system cannot be properly built.	(1) Download the proper firmware. *See "4.2 Downloading Firmware" (page 48).* (2) Recheck the connection between the PC4701 and this product. *See "3.5 Connecting the PC4701 and Emulation Pod" (page 34).*
PD308 version is not the same version as the firmware in the target.	Download the proper firmware. *See "4.2 Downloading Firmware" (page 48).*
Target MCU cannot be reset.	The program may be uncontrollable in areas where memory is not allocated. Recheck the map setting. *See "4.3 Starting Up the Emulator Debugger (Setting EMEM Dialog Box)" (page 49).*
Target is in HOLD state.	(1) The MCU is either in the stop mode or wait mode. Either reset the MCU or cancel the mode with an interrupt. *See MCU specifications.* (2) The program may be uncontrollable in areas where memory is not allocated. Recheck the map setting *See "4.3 Starting Up the Emulator Debugger (Setting EMEM Dialog Box)" (page 49).*
Target clock is stopped.	Check the switches in the emulation pod are correctly set. *See "3.2 Switch Settings" (page 25).*

(4) Errors Occur When the Emulator Debugger Starts Up (When the target system is connected)

Table 6.4 Checkpoints of errors when starting up the emulator debugger (target is connected)

Error	Checkpoint
Target MCU is uncontrollable.	(1) Check pin NMI* is held high. (2) If in memory expansion mode or microprocessor mode, check pins RDY* and HOLD* are "H" level. (3) The program may be uncontrollable in areas where memory is not allocated. Recheck the map setting. *See "4.3 Starting Up the Emulator Debugger (Setting EMEM Dialog Box)" (page 49).*

6.3 Operation Differs from That of Actual MCUs

(1) When the A-D Conversion Values are Different from Expected Values

Because a flexible board and other devices are used between the evaluation MCU and the target system, the A-D converter operates differently from the actual MCU. Make the final evaluation of the A-D converter from the actual MCU.

MEMO

Chapter 7. Maintenance and Guarantee

This chapter describes how to maintenance, repair provisions and how to request for repair.

7.1 Maintenance 70
7.2 Guarantee 70
7.3 Repair Provisions 70
7.4 How to Request for Repair 71

Chapter 7. Maintenance and Guarantee

7.1 Maintenance

If dust or dirt collects on any equipment of your emulation system, wipe it off with a dry soft cloth. Do not use thinner or other solvents because these chemicals can cause the equipment's surface coating to separate.

7.2 Guarantee

If your product becomes faulty within twelve months after its purchase while being used under good conditions by observing "Precautions for Safety" described in Chapter 1 of this user's manual, we will repair or replace your faulty product free of charge. Note, however, that if your product's fault is raised by any one of the following causes, we will repair it or replace it with new one with extra-charge:

- Misuse, abuse, or use under extraordinary conditions
- Unauthorized repair, remodeling, maintenance, and so on
- Inadequate user's system or misuse of it
- Fires, earthquakes, and other unexpected disasters

In the above cases, contact your local distributor. If your product is being leased, consult the leasing company or the owner.

7.3 Repair Provisions

(1) Repair with extra-charge

The products elapsed more than twelve months after purchase can be repaired with extra-charge.

(2) Replacement with extra-charge

If your product's fault falls in any of the following categories, the fault will be corrected by replacing the entire product instead of repair, or you will be advised to purchase new one, depending on the severity of the fault.

- Faulty or broken mechanical portions
- Flaw, separation, or rust in coated or plated portions
- Flaw or cracks in plastic portions
- Faults or breakage caused by improper use or unauthorized repair or modification
- Heavily damaged electric circuits due to overvoltage, overcurrent or shorting of power supply
- Cracks in the printed circuit board or burnt-down patterns
- Wide range of faults that makes replacement less expensive than repair
- Unlocatable or unidentified faults

(3) Expiration of the repair period

When a period of twelve months elapses after the model was dropped from production, repairing products of the model may become impossible.

(4) Transportation fees at sending your product for repair

Please send your product to us for repair at your expense.

7.4 How to Request for Repair

If your product is found faulty, follow the procedure below to send your product for repair.

Customer

Fill in the Repair Request Sheet included with this product, then send it along with this product for repair to your local distributor. Make sure that information in the Repair Request Sheet is written in as much detail as possible to facilitate repair.

Distributor

After checking the contents of fault, the distributor should please send the faulty product along with the Repair Request Sheet to Renesas Solutions Corp.

Renesas Solutions

When the faulty product is repaired, it will be returned to the customer at the earliest convenience.

⚠ CAUTION

Note on Transporting the Product:

- When sending your product for repair, use the packing box and cushion material supplied with this product when delivered to you and specify handling caution for it to be handled as precision equipment. If packing of your product is not complete, it may be damaged during transportation. When you pack your product in a bag, make sure to use conductive polyvinyl supplied with this product (usually a blue bag). When you use other bags, they may cause a trouble on your product because of static electricity.

MEMO

M30830T-RPD-E User's Manual

Rev.1.00
September 1, 2003
REJ10J0260-0100Z

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